

TWIN MOTOR TAO3

3 REBUILDABLE STOCKS
DYNO TESTED & COMPARED



Radio Control

47380



CAR ACTION

THE WORLD'S LEADING R/C CAR MAGAZINE

August 1999

EXCLUSIVE

Corally

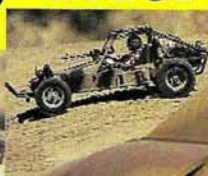
C4

The
Best
Sedan
Yet?

TAMIYA WILD DAGGER
OFNA COLT MINI
CEN GX1 EP
GM COMMANDER
CHARGER

4 super-realistic
Military Machines

PAGE 104



USA \$4.95 CANADA \$5.95



08>

www.rcraction.com

features



104

96 Rebuildable Stock Motor Showdown

We tear 'em down and dyno 'em up

BY STEVE POND

104 Military Muscle

Tamiya's fighting force

BY GREG VOGEL

116 GM Commander Charger

What's in the black box?

BY PETER VIEIRA



60

thrash tests

EXCLUSIVE

60 Corally C4 Touring

Dutch Master • BY PETER VIEIRA

70 Tamiya Wild Dagger

Call of the Wild • BY KEVIN HETMANSKI



78 OFNA Nitro Colt Mini

Pocket performer
BY PETER VIEIRA



86 CEN GX1 EP

Clockwork orange
BY DEREK BUONO



138 Silver State Nitro Challenge

"TTR" wins the jackpot in Vegas

BY GEORGE M. GONZALEZ

160 PROJECT Dual Motor TA03

Extreme drag sedan

BY GREG VOGEL

176 TIME WARP Tamiya Holiday Buggy

'70s sand slinger

BY GREG VOGEL



138

departments

10 Starting Line

18 Readers Write

32 Readers' Rides

123 Racer News

• NEWS FLASHES!

• RACER TIP OF THE MONTH

—provided by Richard Saxton, Team Orion/Associated/Thunder Tiger driver

• INNOVATOR AT WORK

—Philippe Neidhart of Team Orion

• SPEED SHOP

—Traxxas 2.0-inch Touring Car Wheels and Foam Inserts

—Acer Racing Ultra-O Professional Series O-Rings

—Hamad Ghuman Machined Idler Gears

—Team Kinwald Dual Seal Bearing

• RACER PROFILE

—Daryl and Duane Silva

184 Product Watch

• Robinson Racing Nitro RS4 Gear Adapters

• KO Propo EX-11 Presto

• Team Kyosho Carrying Bag

204 R/C Car Action Info Source

208 Classified Ads

209 Manufacturer and advertiser contact information

columns

23 Inside Scoop

BY CHRIS CHIANELLI

38 Pit Tips

BY JIM NEWMAN

44 Troubleshooting

BY DOUG MERTES

50 R/C Doctor

BY DOUG MERTES

56 Piston Power

BY CHRIS CHIANELLI

210 Chris's Back Lot

BY CHRIS CHIANELLI

ON THE COVER (top right): Trinity Paradox rebuildable stock motor; (center): Corally C4 Touring; (bottom, left to right): Tamiya Sherman tank, M1025 Hummer, Fast Attack buggy and King Tiger tank.

Explosive R/C excitement!

I like to think that's what every issue of *R/C Car Action* is all about, but it's especially true of this month's issue. First and foremost, we have Greg Vogel's brilliant look at four Tamiya vehicles with real firepower. Thanks to great shots from Walter Sidas—and Greg's modeling expertise—**Military Muscle** is an eye-popping look at frontline fun, and there's even something in there for you nostalgia lovers. I won't spoil the surprise; check it out for yourself!



Anyone who has ever seen an action movie knows C4 is the gray Play-Doh the bad guys blow stuff up with. C4 can also be used to detonate



your competition—when it's the **Corally C4 Touring**, that is. We have the exclusive test of the innovative racer, and it truly is an impressive machine.

Ready for a blast from the past? This month marks the return of **Time Warp**, our misty-eyed look at kits from yesteryear. Tamiya's classic Holiday Buggy gets the "Remember when?" treatment this time, but you don't have to remember the kit to enjoy the article. With a name like Holiday Buggy, this kit has to make you smile.



I've saved the biggest bombshell for last. Everybody knows that the biggest news to hit racing is the rise of rebuildable stock motors (and if you didn't know, then let me say welcome back from cryogenic suspension). But whose motor has the stuff to make you number one? Senior



editor Steve Pond, motor-man extraordinaire, takes on the current crop of teardowns with his trusty Robitronic dyno for a no-bull shootout in his **Rebuildable Stock Motor Showdown**. You want the

best? You got the best!

Until next month—stay off the boards, and return those tools you borrowed. Later!

Peter Vieira

Peter Vieira

Editor

EDITORIAL

Group Editor-in-Chief TOM ATWOOD
Senior Editors CHRIS CHIANELLI, STEVE POND
Senior West Coast Editor GEORGE M. GONZALEZ
Editor PETER VIEIRA
Assistant Editor GREG VOGEL
Editorial Coordinator DANA DONIA
Editorial Assistant MELISSA L. TOOTHILL

COPY

Copy Director LYNNE SEWELL
Senior Copyeditor MOLLY Z. O'BYRNE
Copyeditors JANE HICKOK, COREY WEBER

ART/DESIGN

Corporate Art Director BETTY K. NERO
Art Director ALAN J. PALERMO
Promotional Art Director LESLIE COSTA
Assistant Art Directors
ALESSANDRA CIRILLO, JOANNA WINN
Staff Photographer WALTER SIDAS

ADVERTISING

Associate Publisher and Director of Advertising
SHARON WARNER
Assistant to Associate Publisher SIRI A. WHEELER
Advertising Manager JILL ELLEN AMALFITANO
Senior Account Executive MONA TASSONE
Advertising Account Executives
KATHRYN GEARHART, FRANK E. SCALCIONE
Advertising Coordinator ANN T. WIEBER

CIRCULATION

Circulation Director NED BIXLER
Circulation Assistant P.J. UVA

OPERATIONS

Director of Operations DAVID BOWERS
Production Associates THOMAS J. HURLEY,
CHRISTOPHER HOFFMASTER

PUBLISHING

Group Publisher LOUIS V. DeFRANCESCO JR.
Publisher YVONNE M. DeFRANCESCO
Associate Publisher SHARON WARNER

CORPORATE

Chairman DR. LOUIS V. DeFRANCESCO
President and CEO MICHAEL F. DOYLE
Vice President G.E. DeFRANCESCO
Secretary L.V. DeFRANCESCO
Treasurer YVONNE M. DeFRANCESCO



Member Audit Bureau
of Circulations

PRINTED IN THE USA



100 East Ridge, Ridgefield, CT 06877-4606, USA



Front-Drive Fever

Your magazine is awesome! I just started in this hobby by helping my nephew with his first kit. I don't have a car myself yet, but I was wondering if you could offer some direction when picking out a kit. I'm looking for something inexpensive, fast, fwd, with plenty of hop-ups. My interest is mainly touring and rally cars. In the June issue, the Tamiya FF02 Peugeot 306 Maxi really caught my eye. Could it be the right kit for me? Would it make a good racecar for an oval track? We have one locally. I would really like to get into racing if it's not too expensive.

JESSE LEWIS
North Port, FL

Since you mention the Tamiya FF02 and a desire for a "fwd" kit, I'm going to assume you really do mean *front-wheel drive*, not 4WD. If that's the case, an FF02 is definitely the car to get, and if you like the looks of the Maxi, your choice is made! It's relatively inexpensive, and you'll find plenty of Tamiya hop-ups for the kit. Now, about your racing aspirations; does your local oval have a "run-whatcha-brung, anything goes" class? If so, they'll probably let you run a front driver. I have a feeling they don't operate such a class, which means you'll be sidelined unless you have a dedicated oval racer. Oval cars are rear-wheel drive and are as far as you can get from rally and touring designs, but if racing is more important to you than having a particular vehicle configuration, go for it. If the track runs a Street Spec or similar cost-controlled class, go for that.

—Pete

Name That Servo

I read your "Oval Car Guide" (June 1999) and thought it was great. I noticed the Headhunter and TRC cars had real flat servos. What's up with that?
WILL HARRIS
Boca Raton, FL

Those are aileron servos; Futaba S9102s. Ailerons are the primary control surfaces on the main wings of model airplanes. Some racers feel that they center better than car servos, but most oval racers I know do not feel that they center any better than the best car servos. I do like to use the shorty servos to lower the center of gravity in cars where the steering servo must be mounted upside-down, as is the case with many minis and some touring cars.

—Pete

Supercharged Nitro?

OK, I have to say that *R/C Car Action* is a great mag, and if my best friend didn't have a habit of permanently borrowing all of my copies, I'd like your magazine even more. My question: is it possible to use compressed air in an R/C car engine to increase power? I've hooked up a compressor to a chain saw (to make a makeshift supercharger), and it added loads of power. Dragsters also use superchargers and nitro fuel, so I think it would work. I'd appreciate any feedback. [email]
ANONYMOUS

Russ Pribanic, one of the more inventive contributors for our sister publication, *Model Airplane News*, built a supercharger that he put on both a .60 and a .90 4-stroke

engine. There was not sufficient exhaust pressure to drive a 1-inch-diameter rotor fast enough. Tests showed the compressor rotor needed to spin at 120,000rpm to produce 4 pounds of additional air pressure. Didn't work, and these engines are obviously bigger than those typ-

ically used in 1/10- and 1/8-scale R/C cars. Thanks for writing.

—Pete

Copy Cat

Why didn't you guys put my truck in "Readers' Rides"? The thing is awesome! Here's the picture again if you lost it. BIGFOOT RULEZ! (sic)
MATT MANESS
La Jolla, CA

Matt, you photocopied the picture of Gene Gandia's truck from the February '99 issue. I know you'd like to have a truck like that, but we require our "Readers' Rides" participants to actually *own* the vehicle in question. Now stop bothering me.

—Pete

Sissy Truck

This letter is to Greg Vogel, who built the Double Trouble Project USA-1 monster truck. After reading the article, all I have to say is: "YOU SISSY." If you want a real double-engine monster, you should get two each of these: Megatech .21 long-stroke engines (2.7hp each); Megatech flywheels; Megatech clutch bells; Megatech turbo plugs; K&N air filters; CVEC pipes; Kyosho clutch shoes, and Super 8 cooling fans. As "Tim Taylor" on "Home Improvement" might say: "AAR AAR AAR AROO." My friends and fellow racers are already placing bets on how fast it would go; I put \$50 on 80mph. Be a man and do it. *R/C Car Action* is my Lord Dominance and Master.
XB-70
Ft. Lauderdale, FL

XB-70 ... as I recall, that was the name of an experimental long-range supersonic bomber in the

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Air Age Inc., *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

INTERNET ADDRESSES:

Chris Chianelli: chrisc@airage.com
George Gonzalez: georgeg@airage.com
Steve Pond: stevep@airage.com
Peter Vieira: peterv@airage.com
Greg Vogel: gregv@airage.com

late '60s that crashed, leading to the cancellation of the project. Anyway, that was pretty manly of you to write me a letter in pencil, call me a sissy and not even use your real name. Well, I won't hold it against you since we are your master. I have received a ton of letters saying the truck is an awesome spectacle, and a few such as yours suggesting that I should have used bigger engines. I'll respond with a quote from Craig Trachten, owner of Hobbytown USA, where I used to work. "It's my toy, and I'll do whatever I want with it." Since you have such big ideas, why don't you build your own truck? After all, project articles are written to give our readers ideas about how to build their own vehicles.

—Greg

Pinup

I was checking out "Readers' Rides" in the June issue when I noticed a beautiful HPI Mercedes body with a scantily dressed babe on the hood. How do I get this on my car? Is it a sticker? Please don't tell me it's painted; if I try to paint something like this, I'm afraid it will end up looking like a 400-pound ape.

JOSH JEFF
Amherst, NY

It is an excellent piece, isn't it? By the way, the "babe" is Christina Ricci; the photo was published in a popular magazine. To get the same look, just cut out your favorite picture and glue it to the inside of the body before you paint it; for complete details, check out Mike Ogle's sedan-detailing tips in the fall 1998 issue of *Radio Control Touring Cars*. I'll warn you that the technique doesn't hold up well in crashes, but it does look cool.

—Greg

TG10-Mk.1PRO



Tamiya's shaft-drive TG10 is now offered in Pro version and comes equipped with many high-performance optional parts such as lightweight, 3mm Duraluminum racing chassis, carbon-fiber upper deck, Tamiya's best swaybars, Tamiya's best TAO3 super-low-friction aluminum-body dampers, a urethane bumper, universal half-shafts, CNC-machined aluminum engine mount, TR15T high-grade brake disk, high-torque servo-saver and aluminum 5mm ball-connectors. Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A; fax (714) 362-2250; www.tamiya.com.



BY CHRIS CHIANELLI



A DIFFERENT TYPE OF DIFF

OFNA has just released its torsen-type differential for today's popular 1/8 buggies, such as Kyosho's MP5/6 and Mugen's MBX4 (look for the torsen diffs to be available for all OFNA buggies soon). Torsen diffs are unique in that they transfer power to the wheel that has the most traction; conventional diffs tend to "unload" on the wheel that has the least traction. Front, center and rear units are available and will be less expensive than other torsen diffs already on the market. According to OFNA, the diffs have been aggressively race-tested and are extremely reliable; they retail for \$159.

OFNA Racing, 22692 Granite Way, Ste. B, Laguna Hills, CA 92653; (949) 586-2910; fax (949) 586-8812.



HPI Goes NASCAR with new RTR kit

Did you just hear a crack of the bat? That was HPI hitting one out of the park with the latest version of the RTR Nitro RS4 kit! In case you aren't already up to speed, I'll fill you in. The RTR Nitro RS4 kit comes 90-percent assembled, including an installed Airtronics Rival 2P and all the usual Nitro RS4 features—plus a few extra goodies, including triple-belt 4WD system, oil-filled shocks (also preassembled), HPI 15FE engine, full ball-bearing set, countersunk purple-anodized aluminum chassis and M-compound Super Radial tires. But the biggie here is the body: HPI's all-new, 1999 Ford Taurus stock-car shell that's just for 200mm touring cars. To complete the NASCAR look, the kit includes authentic stock-car wheels and a decal sheet with window lines, hood pins, air ducts, exhaust pipes, grills and many more details for discerning stock-car fans. The body even includes a scale spoiler, just like the real car! Man, this is gonna be cool; parking-lot oval racing with the great handling of a 4WD TC chassis and the sound and smell of nitro!

HPI, 15321 Barranca Pky., Irvine, CA 92618; (949) 753-1099; fax (949) 753-1098; website: www.hpiracing.com.

1 2 3 BOOM!

Used by all the Team Trinity off-road racing teams, including Brian Kinwald, Bomb One, Bomb Two and Bomb Three inserts give the option of single-, dual-, or triple-stage support technology that allows great versatility in choosing tire firmness to match track conditions. For instance, you can still have a soft tread for high traction while retaining lower hardness that keeps tire sidewalls from rolling under during high-G cornering. The result is that you can fine-tune your tire for more traction no matter where you're racing on a given weekend.

Lok on Line With Kinwald

Developed by Trinity and Brian Kinwald, Team Kinwald's Bead Lok Tire Glue will give you the strongest tire-to-rim bond you've ever had, according to the manufacturer. Designed specifically for off-road truck and buggy use, Bead Lok comes in quick-drying thin or slow-drying thick formulas.

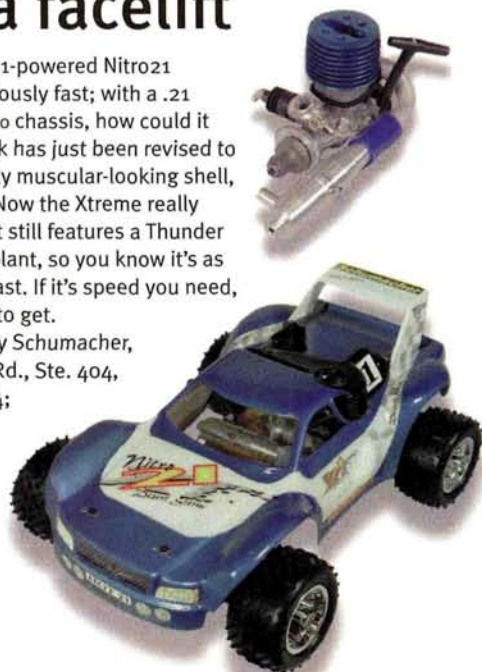
Trinity Products Inc., 36 Meridian Rd., Edison, NJ 08820; (732) 635-1600; fax (732) 635-1640; website: www.teamtrinity.com.



Nitro21 Xtreme gets a facelift

Schumacher's .21-powered Nitro21 Xtreme is ridiculously fast; with a .21 stuffed into a 1/10 chassis, how could it not be? The truck has just been revised to include a suitably muscular-looking shell, as shown here. Now the Xtreme really looks extreme! It still features a Thunder Tiger .21 powerplant, so you know it's as reliable as it is fast. If it's speed you need, this is the truck to get.

Distributed by Schumacher,
6302 Benjamin Rd., Ste. 404,
Tampa, FL 33634;
(813) 889-9691.



Can You Dig It?

Bolink's Digger 2 can be set up for stunts or for "low ridin'" with its cool new chassis design. Improvements in servo mounting and linkage layout and a '99 Bug body make flips, wheelies and rollovers look as easy as they are to perform. Ask for the BL-1346 Digger 2 (kit less electrics) or visit their website.

Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30045;
(770) 963-0252; fax (770) 963-7334.; website: www.bolink.com.



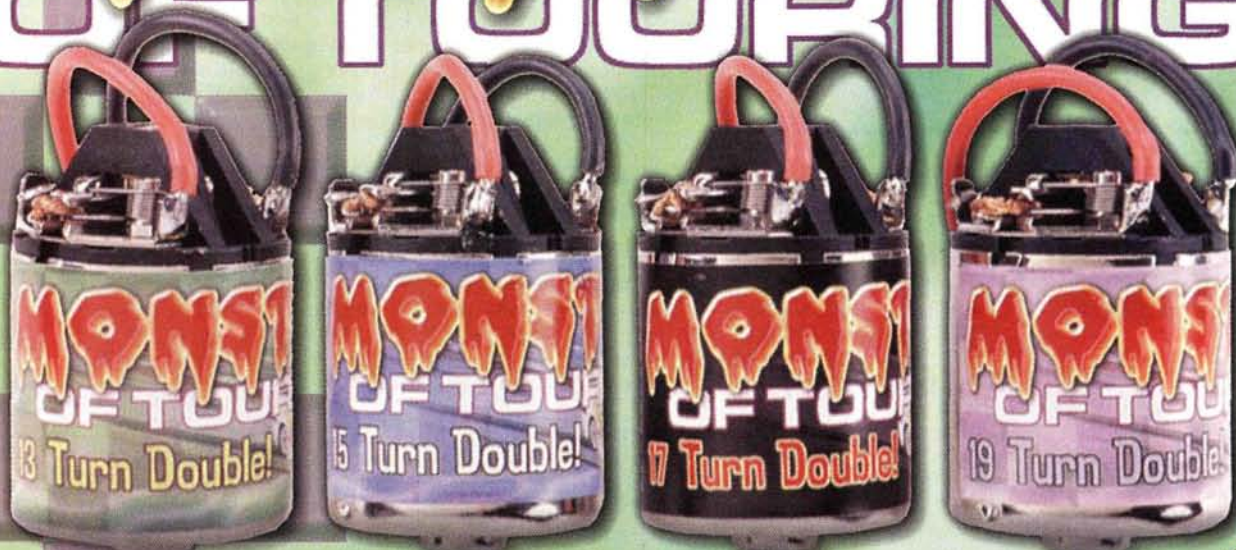
STIFFEN UP THAT GT

This widget may look like a robo-manipulator arm from the Mars Rover, but it's actually a very trick part from R&D Racing for the Associated RC10GT. This nicely machined engine mount stiffens up the chassis and features integral A-arm mounts for a bombproof rear end. Setscrews are used to secure the hinge pins, a nice feature that eliminates E-clips. This is a high-quality piece that can really help out your truck.

R&D Racing, 164 Aero Camino, Goleta, CA 93117; (805) 685-4444.



MONSTERS OF TOURING™



Hemi Style Machine Wound Armature, Bushings, Capacitor & Leads With Bullet Connectors Installed

TRINITY
www.teamtrinity.com

MOT213, 13 Turn Double
MOT215, 15 Turn Double
MOT217, 17 Turn Double
MOT219, 19 Turn Double

Excellent For Off-Road Use!
\$27.99



CALLING ALL JUGGER-NUTS

Here are some new Gold oil shocks designed specifically for Tamiya's awesome new Juggernaut. (BTW, these shocks can also be lengthened for use on a Clod.) Oh yes, and for you "Nighthawks," there is now a light set for the "Jug," too.



Now this is what I call a digital speed control!

The CS Rocket, distributed by Schumacher, features a built-in digital display to show the actual values of its adjustable functions which include frequency, drag brake, partial throttle neutral and more. The on/off switch is built into the compact 40x28x17mm case, and it features 18 MOSFETs for reliable power delivery. That's all the info I have for now; look for more (or a test!) soon.

I Want To Fly Like An Eagle ...

just what "Inside Scoop" needs: lame Steve Miller Band references. At least these Eagle Racing parts are cool! You've seen trick aluminum parts before, but these parts aren't just for looking pretty. They're constructed of 7075 alloy, which is very hard, rigid stuff. If you want a zero-flex suspension, these parts will do it! They're all designed to fit the RS4 Pro 2 and can also be used on other RS4 series cars wherever parts are shared with the Pro 2. The purple anodizing and machine work is flawless, and they should definitely look hot when matched with the Pro 2's stock purple parts. Moving in from the sides of the shot, we see the rear hub carriers (part no. 1264), steering blocks (1261), rear suspension arms (1265), front suspension arms (1263), front hub carrier (1262) and graphite shock towers (1257, front; 1258, rear).

Eagle Racing, distributed by Integy,
1140 Center Dr., #E, City of Industry, CA 91789;
(909) 444-2766; email: INTEGY1@aol.com.



TRC

TEAM LOSI

STREET WEAPON

Touring Foams

DO YOU RACE YOUR TOURING CAR ON CARPET. OR ARE YOU JUST TIRED OF THE NEW RUBBER TIRE OF THE WEEK GAME?



STANDARD FOAM

TT1141	Green Mounted and Trued	\$14.99
TT1142	Blue Mounted and Trued	\$14.99
TT1143	Double Blue Mounted and Trued	\$14.99

EXOTIC NATURAL RUBBER

TT1150	White Mounted and Trued	\$17.99
TT1151	Gray Mounted and Trued	\$17.99
TT1152	Platinum Mounted and Trued	\$20.99
TT1153	Pink Mounted and Trued	\$20.99
TT1154	Purple Mounted and Trued	\$20.99
TT1155	Red Mounted and Trued	\$20.99

All tires come in pairs and are on Street Weapon rims

36 Meridian Road
Edison, NJ 08820
Ph: 732-635-1600
Fx: 732-635-1640

Standard Models Available
To Fit HPI, Tamiya, Kyosho
Yokomo, Schumacher Etc.

Get a Ph.D. in Speed from GM Racing

The GM guys have been awfully busy lately; they just cranked the Pinnacle rebuildable stocker out the door, and now they've followed up with two new spinners for budget racers as well as you spendy, speed-costs-and-I'm-buyin' types. The Dr. Speed motors are GM's machine-wound budget mods, but don't look for any design skimps; the can, endbell and hardware are all identical to the other new GM motor, the hand-wound EVO3. This new design features additional vent holes for cool running, "integrated air channels" in the endbell, brush-hood stabilizers, purple endbell heat



sinks and a comm inspection hole. Inside, the pattern-wound, "hemi wrap" armature is epoxy-balanced. It's gotta be fast! Also shown: GM's new RC2000 matched cells with PEP (Performance Enhancement Process) conditioning, which matches the cells by discharge curve instead of run time. The PEP system uses a 17A discharge rate, which is claimed to deliver more consistent results for a more accurate match.



GM Racing, 416 Ohio Ave., McDonald, OH 44437; (330) 530-2330; website: www.gm-racing.de.

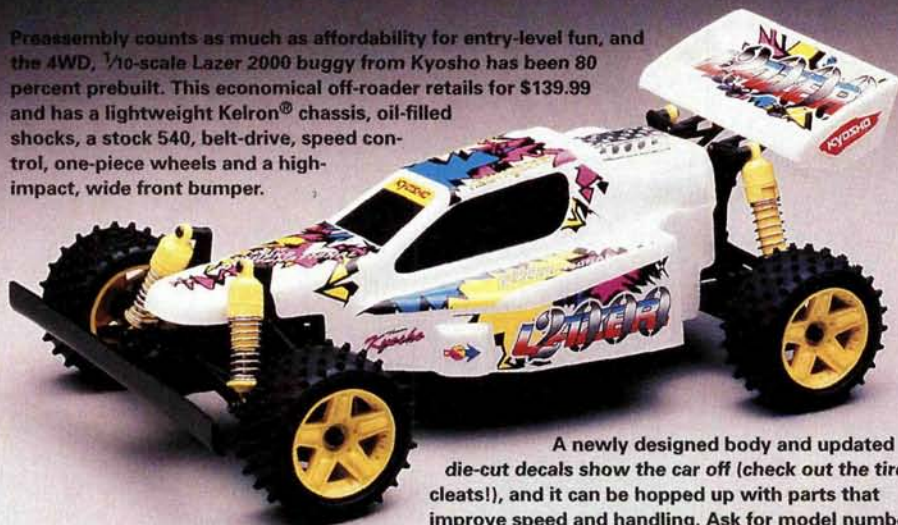


New 190mm Altezza shell

If you're after a new look for your tourer, HPI has a body for you. Currently available overseas as the Toyota Altezza, this machine is set for a Y2K release with a Lexus IS 200 badge. Like all HPI Racing bodies, the Altezza/IS 200 comes with protective overspray film, window masks and a large decal sheet that includes headlights, tail-lights and grills, plus official Lexus IS 200 and Toyota Altezza logos. HPI, 15321 Barranca Pky., Irvine, CA 92618; (949) 753-1099; fax (949) 753-1098; website: www.hpiracing.com.

Lazer 2000: 80-percent preassembled

Preassembly counts as much as affordability for entry-level fun, and the 4WD, 1/10-scale Lazer 2000 buggy from Kyosho has been 80 percent prebuilt. This economical off-roader retails for \$139.99 and has a lightweight Kelron® chassis, oil-filled shocks, a stock 540, belt-drive, speed control, one-piece wheels and a high-impact, wide front bumper.



A newly designed body and updated die-cut decals show the car off (check out the tire cleats!), and it can be hopped up with parts that improve speed and handling. Ask for model number KYOC0102.

Great Planes Model Distributors, 2904 Research Rd., P.O. Box 9021, Champaign, IL 61826-9021; (800) 682-8948; fax (217) 398-0008.



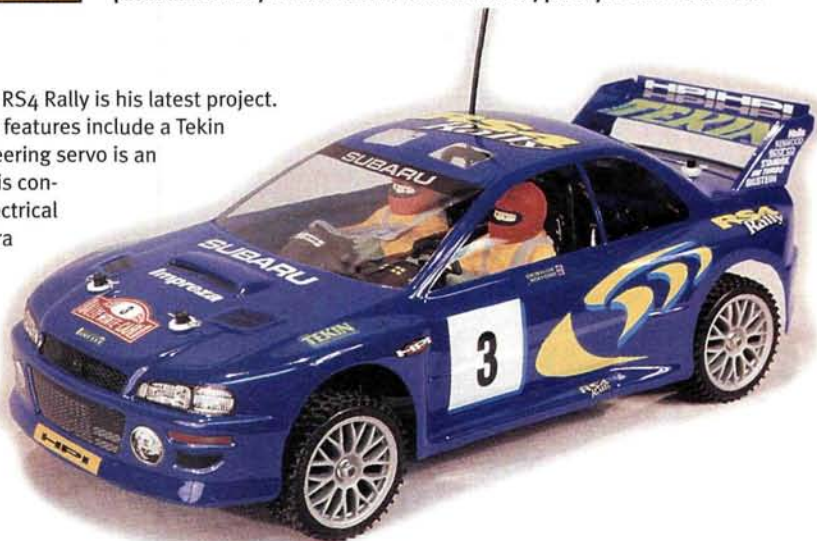
TAMIYA'S 2-SEAT HONDA

Of course, Tamiya has quickly hopped on producing Honda's new, 2-seat sports car. I can't tell you much now, but the new car appears to be on a narrow version of the Tamiya TLO1 chassis. As usual, I'll keep you posted.

Send a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, *R/C Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. If we choose to feature your creation, you'll receive a 6-month subscription to *R/C Car Action*, or an extension of your existing subscription. You'll also be eligible to win a \$500 gift certificate from DuraTrax in the ninth annual "Readers' Rides of the Year Contest" in the fall of 1999. In case we need to contact you, write your address and phone number on your letter and on the back of every photo you send. Good luck!

Rally Action

Brian Dell of Richmond Hill, Ontario, Canada, says this HPI RS4 Rally is his latest project. Under the hood is a Trinity Speed Gems Ruby motor. Other features include a Tekin Rebel ESC and a 7-cell Sanyo RC2000 battery pack. The steering servo is an FMA Direct high-torque, ball-bearing, metal-gear unit that is controlled by a Futaba Magnum Junior radio. To ensure low electrical resistance, the car's wiring consists of Deans 12-gauge Ultra Wire with Power Pole connectors. Brian says the car is very fast, handles excellently and is a lot of fun to drive.



Look Familiar?

Chuck Tullo of Scotch Plains, NJ, says his RC10L is a replica of NASCAR racer Rusty Wallace's car—as it appeared four years ago. The car is equipped with a Tekin Speedstar MEGAFET speed control and 16-turn hand-wound Trinity D3 modified motor. A Futaba radio keeps it "on track."



Hummin' Along

This Clodzilla IV belongs to Matthew Kwiatkowski of Sooke, B.C., Canada, and he says it's awesome on any terrain. He added a Clodzilla IV racing chassis, chrome rims, two ESP steering links, four gold shocks and a Novak Super Rooster ESC. Two Hitec HS-615MG "ultra-power" servos handle the steering and two 17-turn Matched Madness motors power the truck. This monster also has working RAM lights powered by a 9V battery and four AAA cells. Anyone up for nighttime four-wheelin'?



Diverse R/C

Richard Whitaker of Brookings, OR, sent us this diverse group of R/C vehicles, all of which have full ball bearings. The ESP Clodzilla IV has a full race kit that features ESP front and rear bumpers and skidplates and ESP aluminum steering link. The Clod also features Thorp ball diffs, Kyosho gold shocks, Kyosho Nitro USA-1 tires, a Novak Super Rooster ESC, a Futaba receiver, Trinity Gem-2 14-turn double motors, Holeshot super coolers and a Cirrus CS 80 BB MG steering servo. The Kyosho



Nitro Blizzard has all the available Kyosho options, a DuraTrax tuned pipe and scratch-built skidplate and aluminum bash guard. Next is a Kyosho Nitro Mantis powered by an O.S. CV with MIP head and boost bottle. Other hop-ups include a ball diff, universal drive shafts, stainless-steel oil shocks, CS 60 BB servo, JR FM receiver and Pro-Line tires and rims. The Losi XXT 'CR' features Lunsford rods and pins and Hammad Ghuman rear hub carriers, diff gear and top shaft. Other parts include a Novak receiver and Super Rooster ESC. Richard runs Trinity and Maxtec motors depending on the track. Richard's "really old" Kyosho FW-19 F1 car uses a DuraTrax aluminum rear pod kit, an oil damper, a Novak Duster and a Hitec Shredder receiver. The Bolink vehicle has a Novak Explorer ESC, and a Futaba receiver and S148 servo.

Inferno Forever

Dean Scott of Kirkland, WA, has an old Inferno and recently purchased a new MP-6 that's powered by an O.S. 21 RZ-B engine that breathes through a Paris AL-65 pipe. He added Kyosho's steel main gear and dropped in a JR Racing 4131 servo for brake and throttle along with a JR Racing 4735 servo for steering. The MP-6 also



features a Futaba 3PDF radio and FP-R113F receiver with a 6V Sanyo 1000mAh 5-cell onboard receiver pack. Dean could already tell the MP-6 was a big improvement on the Inferno during break-in. Excellent paintwork on the body, Dean; the buggy looks hot!

"Rug Doctor"

Dan Klaas of Gibsonia, PA, recently re-entered the R/C car world with this Associated T3. He modified it for street and carpet racing, thus the "Rug Doctor" name. Among its features are a Racetech Black Widow 2 stock motor, Robinson Absolute pinion and spur gears, RPM gear cover, a Cyclone ESC and Polaris receiver from Novak, Team Orion activated 1700 cells, Deans Ultra Plug connectors and 12-gauge Ultra Wire and a titanium hinge pin and turnbuckle set. Team Associated parts include front and rear anti-roll kits and blue springs. Wheels are Pro-Line's low-profile 2.2-inch foam tires mounted on Eliminator rims.



Finish Line

Tracy Terrana and Angelo Koutras of Staten Island, NY, race these cars weekly. The Tamiya mini in the middle belongs to Tracy. It's based on an Mo2 chassis with a Novak 610 reverse speed control and a Futaba 9304 steering servo. Angelo owns the Tamiya F1, which has an F103RS chassis, all Tamiya hop-ups, a Novak Atom programmable speed control and a Futaba 132 steering servo. The touring car has an HPI RS4 Pro 2 chassis and features a Cyclone ESC and an Airtronics 94257 steering servo. All three cars are controlled by Futaba FM radios. Angelo painted all three, while Tracy gave a hand with the detailing.

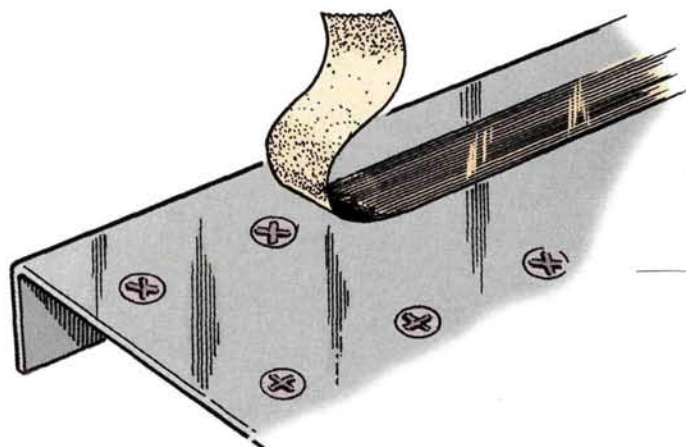


Collection of a Decade

Scott Muir of Lexington, KY, says this collection of R/C vehicles spans 10 years. The Kyosho USA-1 Nitro Crusher features an O.S. .21 ported and polished engine, Futaba 3PD with S9304 servos and custom aluminum sideguards and body mounts. The Tamiya Clod Buster has a Sassy stretch chassis, Sees aluminum wheels, Speedworks Monster Mash motors, Futaba Magnum Jr. radio and Novak ESC. The Traxxas Nitro Hawk uses an O.S. .12 CZ-Z engine that's ported and polished, an MIP stinger and a Futaba 3PD radio. A Trinity Speed Gem motor powers the Parma Hemi Coupe and is controlled by a Futaba 3PD radio. Scott's HPI RS4 Corvette has an O.S. .15 CV beneath the hood. Other features include a Paris Turbo Ring pipe, a 2-speed tranny, a Futaba 3PD radio, Kawada wheels and an MIP temperature gauge. The boat—a Traxxas Villain IV with twin motors—is all stock except for the paint.

BY JIM NEWMAN

Radio Control Car Action will give a one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



Dirt Exclusive

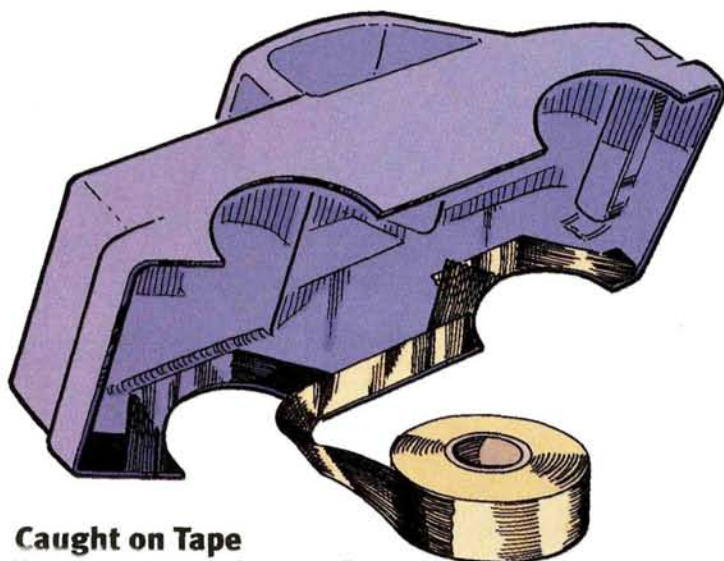
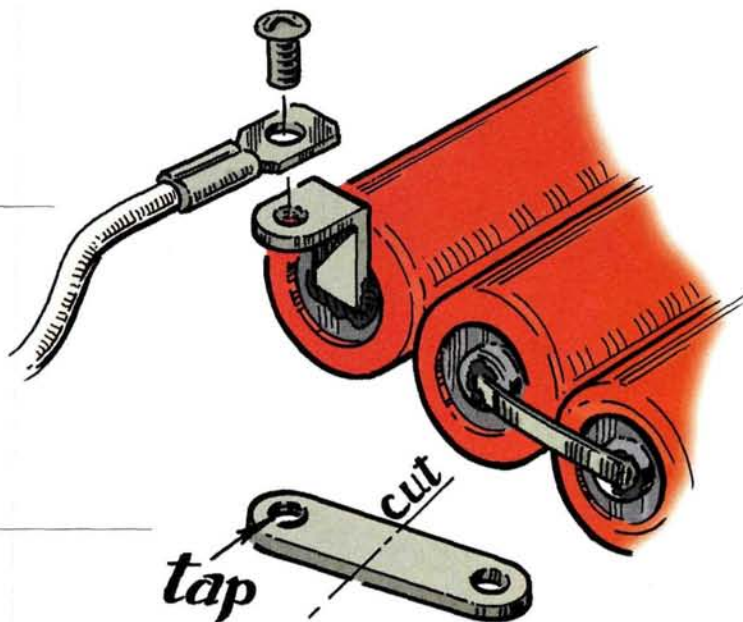
Apply vinyl tape over any screw heads in the bottom of the chassis to prevent mud and grit from clogging them. When it's time to wrench, just peel away the tape to reveal shiny, screwdriver-friendly screws.

LONDON YEE
San Rafael, CA

Screw Connection

Make screw-together battery connectors by threading the holes in a pair of Deans bars with a 4-40 tap. Cut each in half, bend as shown, then solder to the positive and negative ends of the pack. Use terminal lugs on the ESC wires to make the connections. Be sure to slip rubber fuel line over the terminals to prevent short circuits.

MATT MELONI
Scottsdale, AZ



Caught on Tape

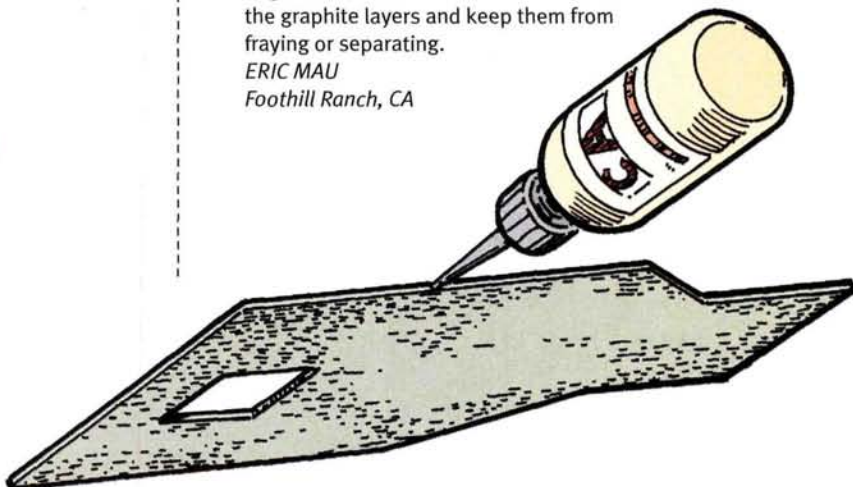
You can prevent cracks from spreading (or from forming in the first place) by applying a strip of electrical tape to the lower inside edge of the body shell. Use colored tape to match the paint scheme, or to prevent show-through with lighter-colored bodies.

JUSTIN BOXILL
Menomonee Falls, WI

Ragged Edge

Graphite chassis can delaminate over time, particularly if you tend to tap the boards. To prevent this, apply thin CA to the edge of the chassis. The CA will "wick" into the graphite layers and keep them from fraying or separating.

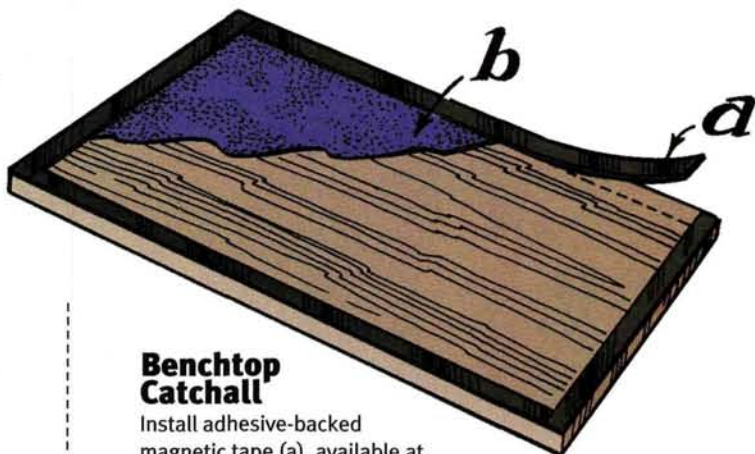
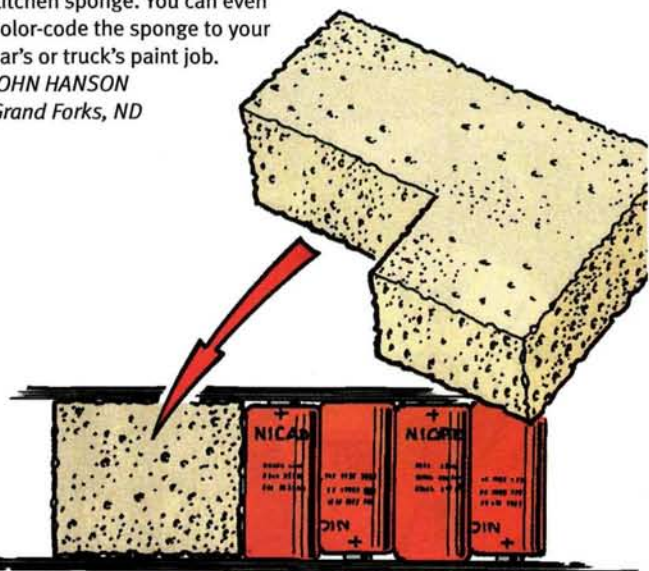
ERIC MAU
Foothill Ranch, CA



The Ol' Sponge Trick

Lost battery-pack spacers can be replaced with blocks cut from a kitchen sponge. You can even color-code the sponge to your car's or truck's paint job.

JOHN HANSON
Grand Forks, ND



Benchtop Catchall

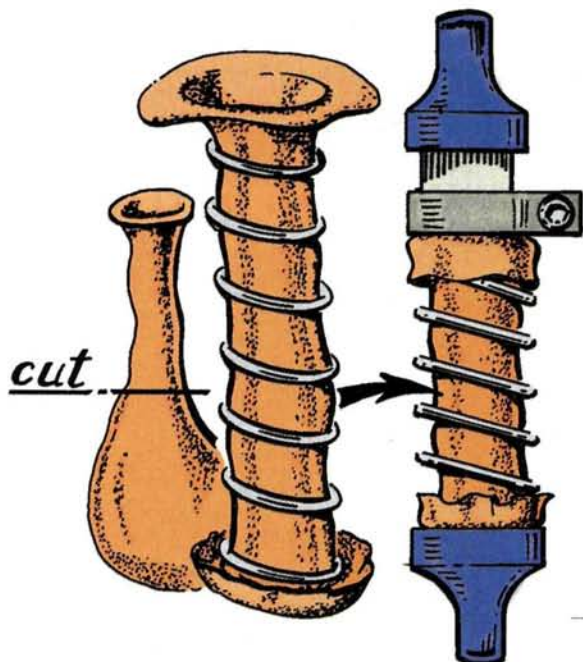
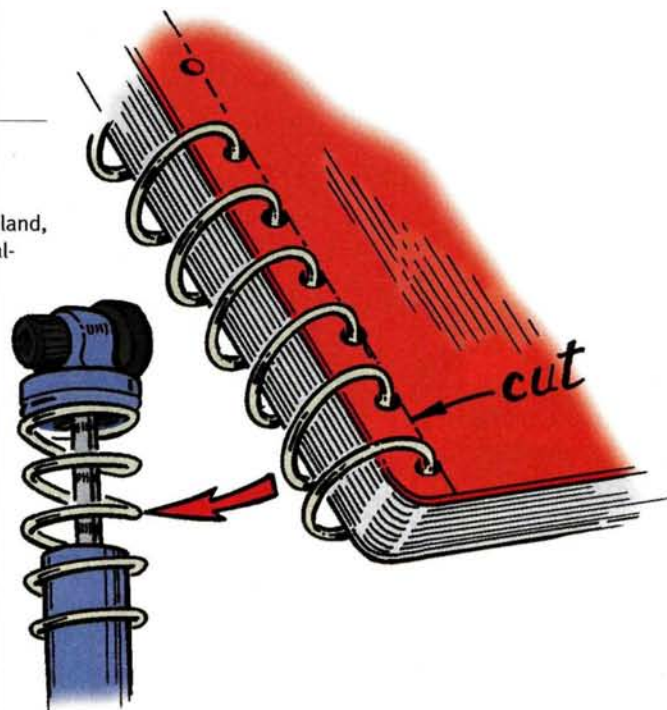
Install adhesive-backed magnetic tape (a), available at hardware stores, around the edge of your bench, or apply it to a workboard. The magnetic material will grab any steel hardware that might otherwise roll off the bench (diff balls, anyone?). To prevent dropped screws from bouncing off, glue a piece of felt (b) to the board.

DEVIN PADGETT
Cohutta, GA

Spring Time

When Steve's car jettisoned a spring into never-never land, he made do with a section of "spring" cut from a spiral-bound notebook. Hey, whatever works!

STEVE BAFUS
Richland, WA



Inside-Out Boots

You've seen shock boots before, but these differ in that they are installed beneath the springs and use the springs to hold them in place. Cut the neck from a party balloon, then pass it through the spring, folding the ends over to make a cuff as shown.

ROWDY CHARPENTIER
Cut Off, LA



ROBINSON RACING PRODUCTS

TROUBLESHOOTING

BY DOUG MERTES • ILLUSTRATIONS BY JIM NEWMAN

Gleam Machine

I saw a used RC10 truck for sale at a hobby shop recently. The aluminum chassis was stock, but there wasn't any black paint; the finish on it was something like the aluminum front wheels on a Bolink funny car. The people at the hobby shop told me that the guy who owned the RC10 had removed the paint and polished it himself. They couldn't remember who he was or how he had done it. Could you suggest a type or brand of paint stripper, polish, or other method of removing paint and some tips on how to do it?

JOHN HARKINS, Greenville, KY

Actually, there are several ways to remove paints and coatings from aluminum parts. I suggest you begin by trying a solvent such as 32/154 brake cleaner on the surface. Do this only in a well-ventilated area, avoid inhaling any fumes and wear rubber gloves to protect your skin. This works better on anodized aluminum than on powder-coated surfaces.

If the brake cleaner doesn't work, then use a buffing wheel mounted on a drill or grinding tool to remove the coating a little at a time without damaging the underlying surface. Start with a coarse grade buffing com-

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at *Radio Control Car Action*, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.



pound and work your way up to an intermediate and, finally, a super-fine grade of jeweler's rouge. Don't try to use sandpaper; the resulting scratches will take hours to polish out.

This process takes a lot of time, but be patient and you'll be rewarded with a beautiful, lustrous result. Once the protective coating has been removed, an automotive paste wax will seal the surface and keep it shiny.

An alternative to wax would be to spray on a coat of clear lacquer, but either way, you'll spend more time maintaining the finish of your silver tub than if you had just left it as it was.

Extreme Results From RRP.

Richard Saxton Chooses Precision Components From Robinson!



'998 World Cup and National Champion Richard Saxton:
"I only care about performance, and that's why I run Robinson Racing gears and slipper clutches exclusively."

— Richard Saxton



Absolute Series Pinions: Available in 48P in 16T thru 28T sizes. Super hard, lightened and cut unmatched precision. Great with any spur, but with an Absolute spur, even on-off noise is gone! RRP 1416 - RRP 1428.



Absolute Series Spurs: Available in 48P in 80T thru 91T, this is the quietest spur you can buy! RRP 1780 - RRP 1791.



RC10 GT Clutch Bells: Precision machined one-at-a-time from a single piece of steel and then hardened. Fits ALL Associated and MIP shoes. (New 14T) RRP 2214 - RRP 2224.



RC10 GT Gas Spurs: Super tough and precision machined from heat-resistant plastic mesh flawlessly with our Clutch Bells. 32P in 61T thru 67T. RRP 2261 - RRP 2267.



Associated Blue Lightened Slipper Kit:

The rear plate is hard anodized to reduce wear and the front plate is color treated. The front plate is designed to hold the slipper pad forcing the pad to slip on the rear plate. When pad shows sign of wear just flip it over for a new surface. Metal parts are CNC machined for a flawless fit. RRP 1515.



Titanium Stealth Top Shaft: CNC Machined from a single piece of titanium, this super hard, super light top shaft will fit any Stealth transmission. No serious racer should do without this part. RRP 1512.

"Turn to Robinson Racing when compromise is out of the question."

ROBINSON RACING PRODUCTS • 4968 Meadow View Drive • Mariposa, CA 95338
Voice 209.966.2465 • Fax 209.966.5937 • www.robinsonracing.com

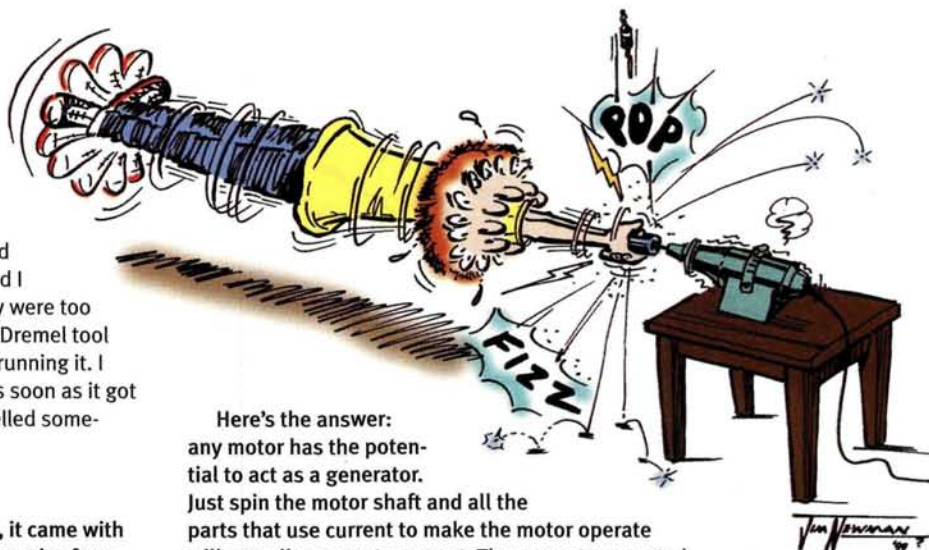


Diode Dilemma

I just bought a new stock motor and an electronic speed control for my HPI RS4 Pro. I got rid of the reversing speed control so I could go racing and got a high-performance one that only has forward and brakes. After I had installed everything, one of the guys at my track suggested I remove the motor and break in the bushings because they were too tight and would slow down my car. He told me to attach a Dremel tool to the motor shaft and use it to spin the motor instead of running it. I borrowed my friend's Dremel tool and hooked it up, but as soon as it got the motor spinning really fast, I heard a loud pop and smelled something burning. Did I ruin my brand-new motor?

DANNY JAYNES, Boston, MA

Here's the problem: when you bought your speed control, it came with a Schottky diode. This isn't something that you would recognize from your reversing speed control because they can't use them. These diodes are installed on the motor to improve the function of the regenerating circuitry and to reduce brake fade and radio interference on forward-only racing speed controls. This diode, which is installed on the motor tabs, is polarized and that means that current can only flow through it in one direction. The "pop" you heard was caused by current flowing through the diode backwards. But if the motor wasn't connected to any power source, where did the current come from?



Here's the answer: any motor has the potential to act as a generator. Just spin the motor shaft and all the parts that use current to make the motor operate will actually generate current. The current generated, however, is the reverse of the current that would be used to normally power the motor when spinning in the same direction.

When you hooked up your motor to the Dremel tool and spun it in the same direction it spins in use, the motor generated reverse current and that popped the diode. To avoid this, you could spin the armature in reverse, or remove the diode, but the easiest thing to do is simply remove the brushes from the hoods. Without the brushes in place, your motor won't generate any juice.

Extreme Performance For You.

New, Performance Accessories For Your Racing Machines!



HPI RS4 Diff Pulleys: Precision machined, hard anodized aluminum diff pulleys. RRP 1539 fits HPI Nitro sedans. RRP 1528 fits HPI electric sedans.



RC10GT Diff Gear: Hard anodized, precision machined aluminum diff gear. RRP 1513.



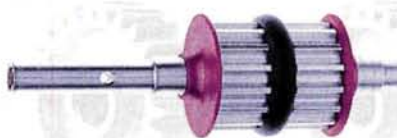
RS4 Nitro 32 Pitch Conversion Kit: The slightly finer (than stock) pitch allows for more gear ratios. All components are precision machined for smooth and efficient performance. 17T hardened bell is precision cut from solid stock. RRP 1536.



HPI SuperLite™ Purple Aluminum Sedan Pinions: They're lightened, hard coated and precision cut. Available in 48P in 16T thru 28T, and 64P in 24T thru 38T. RRP 30XX (48P) and RRP 31XX (64P). Only \$5.25.



HPI RS4 Nitro Small Drive Pulleys: Precision machined and hard anodized aluminum drive pulleys. RRP 1538.



HPI RS4 Top Shaft Pulley: One piece pulley and shaft are precision cut and hard anodized. Purple anodized side flanges are pressed on. RRP 1527.



1998 ROAR On-Road National Champ John McIntosh: "Robinson Racing Products give me a definite competitive edge – that's why I run them."

— John R. McIntosh II

"For over a decade, Robinson Racing has brought you, the racer, the highest performing gears and accessories available for RC racing."

ROBINSON RACING PRODUCTS · 4968 Meadow View Drive · Mariposa, CA 95338
Voice 209.966.2465 · Fax 209.966.5937 · www.robinsonracing.com

RRP
ROBINSON RACING PRODUCTS



RRP

ROBINSON RACING PRODUCTS

TROUBLESHOOTING



Toothless Tamiya

I have a Tamiya Ford F-150 with a Trinity Midnight motor, a Trinity Ex-Tech 2000 battery pack, a Futaba MC210CB speed control and a Futaba Magnum Junior radio. My problem is that I keep ruining spur gears. A few teeth (about 10 to 20) become flattened. I have gone through four spur gears in about four months. I have the original stock gearing (a 74-tooth spur gear and a 17-tooth pinion gear). What's the matter? Is the motor getting so hot that the heat is being transmitted through the pinion gear to the spur gear and melting it? Would it be a good idea to get a motor cooler?

STEPHEN SMITH, Huntington, NY

The Tamiya Ford F-150 truck is based on Tamiya's TAO1 and TAO2 sedans that have been proven and reliable performers for years. Even if you run your truck through several battery packs in a row without giving the motor a rest, it's unlikely that enough heat would be transmitted through the pinion gear to melt the spur. It's much more likely that your trouble is due to improper installation of the motor-mounting plate.

As you know, the motor in the F-150 is first screwed to a motor-mounting plate (with the fiber heat/dust shield sandwiched beneath it) and then the mounting plate is screwed

to the transmission housing. This method ensures ideal pinion/spur mesh in the totally enclosed transmission. It is possible, however, to use the wrong holes in the motor plate. The different holes in the motor-mounting plate accommodate the use of 16- to 21-tooth pinion gears. If you accidentally mounted the motor in the holes for an 18-tooth pinion and you're actually using a 17 tooth, it could cause the damage you described. Go back to your assembly manual and make sure that you are utilizing the correct motor-plate holes.

There's also an outside chance that one of the little plastic caps that is installed at each end of the spur-gear shaft is missing. These caps (referred to as part no. G3 in the instruction manual) fit into recesses in the transmission case and hold the gears in proper mesh. A missing cap could cause the problem you describe, even if the motor screws are installed through the proper holes.

Fuel Flip-Flop

I have an Associated RC10 GT and want to know if it is safe to change fuels. Some of my friends said it was OK, but others said it wasn't. I currently use O'Donnell and would like to change to Blue Thunder because my local shop carries it.

HANS BISHOP, Atlanta, IL

Either brand of fuel will work just fine in your GT. When choosing nitro, the important things to remember are the percentage of oil in the mix and the nitro content. You didn't mention which engine you have in your GT, but most trucks do well with a 15- or 20-percent nitro mix.

Just make sure that you use fresh car fuel—not stuff made for helicopters or airplanes—from a name brand manufacturer and don't tilt the can too much (that's drag racer talk for increasing the percentage of nitro). Both O'Donnell and Blue Thunder are well-known names in gas circles, and I'm sure you'll be happy with either product. You might need to slightly re-tune your carb when changing fuels, but, aside from that, you're good to go.



Keep the Pipeline Open

One of the really neat things about my professional life is that I have the opportunity to race in several states, at lots of tracks, in many different classes and with all sorts of people. Whether it's off-road or on-road, cars, trucks or buggies, stock, spec, or modified, if there are a bunch of guys all working at ways to get around the last corner in first place, I'm interested in trying my hand at it.

I've gotten used to showing up on the first day of an event and trying to make the upper end of the field with a minimal practice, even when the odds are against it. One thing that's always helped me out is that my cars and trucks are, well, extremely fast. In fact, it's not unusual for several drivers to head to my pit table after the first practice session or qualifier in order to scope out my stuff to find out why my cars are so fast.

First, we go through the whole "How are you cheating?" routine, but a cursory examination of my equipment by an experienced driver will reveal that everything is set up according to the rules. The argument that usually follows is "If he's not cheating, then he must have access to nuclear racing packs, right?" Then, we'll compare battery numbers and motor dyno figures, and they quickly find that their batteries and motors are as good or better than what I'm using. Finally, we get down to the real reasons why my stuff is so quick. That's when I pull off the body and start discussing theories regarding efficiency and how they relate to the speed of an electric-powered vehicle.

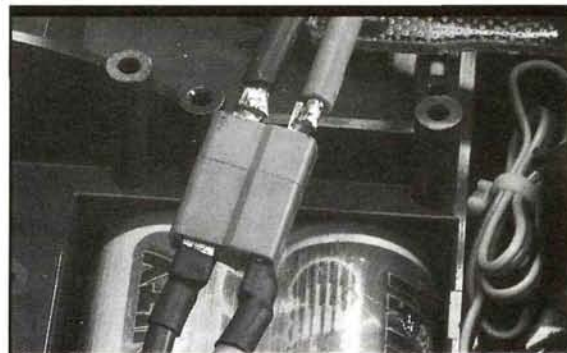
GET WIRED

I tell racers, "You must keep the pipeline open" because it's the easiest way to describe the efficiency concept. Think of the wires that connect the battery pack, ESC and the motor as a pipeline, or delivery system for current. This pipeline must be as free of kinks and bottle-

necks as possible. Just as a botched plumbing job can slow the flow of water to your kitchen sink, a sloppy wiring job can reduce power flow to your battery.

Almost all of my cars are hard-wired, and I always use a side-by-side or saddle-pack battery configuration and a three-wire ESC when I can get

away with it. There are probably dozens of ways to free up the pipeline in an R/C vehicle, and I will pass along a few. If you follow the tips I provide, I guarantee that you will add some significant horsepower to your ride and increase its run time *without* spending a whole lot of money!



Tamiya-type connectors (below) are the standard for stick packs, but they aren't very efficient and can actually get hot enough to melt in big-amp applications. Better to switch to Deans (above) or Sermos plugs that have no more resistance than the lengths of wire they replace.*



HARD WIRE OR PLUGS?

Hard-wiring (in many cases) really isn't necessary these days, but it's a habit I developed years ago when it was the ultimate way to ensure minimal voltage loss. Today's low-loss plugs from aftermarket companies such as Deans, Acer Racing and AstroFlight* have very little or no loss in resistance, and that makes using them not only efficient but also convenient. Team Orion* and Reedy* also sell battery tubes that are the next best thing to hard-wiring and ensure the shortest wire length possible.



Use quality battery bars to assemble your packs; Trinity, GM and Team Orion bars are pictured. I like to use a bent bar on the ends of my packs for easier soldering.

THE CELL-TO-CELL CONNECTION

To get the maximum punch from your batteries—no matter how good they are—it's important that they be able to combine their voltage and amperage with as little interference as possible. That's why I recommend high-quality battery bars such as those from Trinity*, Orion*, Deans*, or BRP*. Good, low-resistance bars like these ensure that the voltage flows easily from cell to cell. You may pay an extra buck or two per pack, but the performance you will achieve is well worth it.

Another way to ensure that the voltage flows through the entire electrical system as efficiently as possible is to use a high-quality silver solder. Companies like Acer Racing*, Deans and several others sell high-quality silver solder that is proven to be more efficient than the hardware-store variety, lead-based solders many racers use. Ask any battery matcher in the business, and they'll tell you that the weakest links in a typical R/C electric system are the solder joints. Next time you plop your hard-earned money on a top-shelf matched pack, do yourself a favor and put it together using high-quality silver solder.

It's a good idea to individually shrink-wrap each cell before assembling them in a pack; this keeps the bars from shorting out on the cell casing and protects the cells when they're mounted on conductive surfaces such as graphite. Applying shrink-wrap also helps keep the cells looking like new even after repeated applications of strapping tape.

The cell ends should be lightly abraded with a file or grinding tool to remove a little bit of the shiny surface plating that can prevent solder from adhering to the battery. All it takes is a dab of solder on each end of the battery bar to tin it sufficiently so that everything goes together without applying the tip of the soldering iron to the end of the cell for too long. Excess heat can damage the cells and alter their chemical composition. In addition, I like to use battery bars that are bent to a 90-degree angle on each end of side-by-side or saddle-pack battery setups. The end result of this careful cell prep and assembly is a finished pack whose combined voltage is very close to the sum of the individual voltages of the single cells. In other words, if the average cell voltage in a 6-cell pack is 1.15 volts, there's no way you can get better than 6.90 average volts out of the pack. With many cell-assembly techniques, you can actually *lose* an appreciable amount of voltage due to the resistance of the wire and bars used to assemble the pack. Using the assembly process described above, those cells should test out at a pack voltage of 6.84 volts or better; that's really very good. Losing such a small amount of voltage when taking 14 soldered connections and the resistance of the battery bars into account means you're successfully keeping the voltage pipeline open.

THE ESC CONNECTION

Folks who regularly race with me know that I spend a lot of time just gazing at my car and working on ways to make my wiring system more efficient. It's not unusual for me to wire and rewire a car four or five times until I'm happy with the way it all works. To meet my high standards, the wires must be as short as possible without affecting the car's handling in any way because of interference with suspension parts. That's one reason I like ESCs with external soldering posts that allow you to replace wires quickly and easily without having to send the unit back to the service depot.

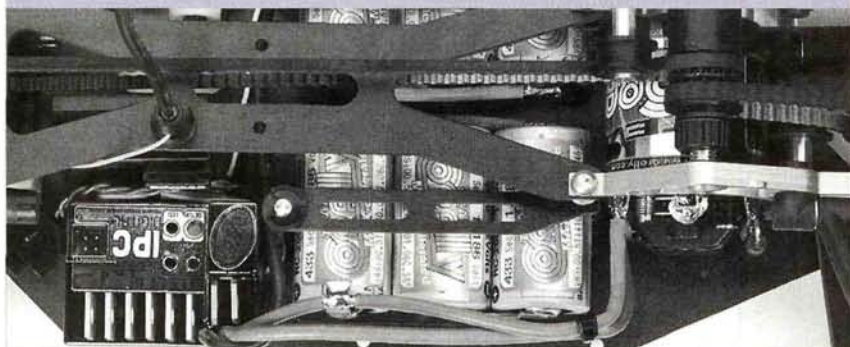
Here's a hot tip: the ESC itself uses very little amperage and doesn't need a super-thick positive power lead to connect to the positive terminal on the battery. The extra positive lead that taps into the thick positive wire from the motor to the ESC can be much smaller than those used to connect the rest of the electrical system; in fact, 14-gauge wire is what I normally use. This small-gauge wire is sufficient for the voltage requirements of the

ESC and results in a wiring harness that is very flexible and a little lighter, yet keeps the pipeline free of kinks to the ESC.

If you're running a modified or hot stock motor, you should always use 12- or 14-gauge wires to connect the battery's negative terminal to the ESC and to connect the ESC's negative terminal to the motor. Unlike the ESC's (positive) lead, these wires carry major voltage demands between the motor and the speed control. Think of big, thick 12-gauge wires as larger pipes that can carry much more energy from the battery to the motor. To maximize their efficiency, the solder connections at the battery and motor should be nice and shiny, without any big lumps of solder or frayed wires sticking out. Again, using high-quality solder in this area can also improve the power flow.

One electronic kink that I frequently encounter on some of the slower racers' cars is butt solder joints that extend the length of the wires. Since every solder joint decreases the efficiency of the circuit and adds a little resistance, avoid extending wires whenever possible. It's better to send the ESC in for service and have new leads installed than to place a power-robbing solder joint in this critical phase of the power circuit.

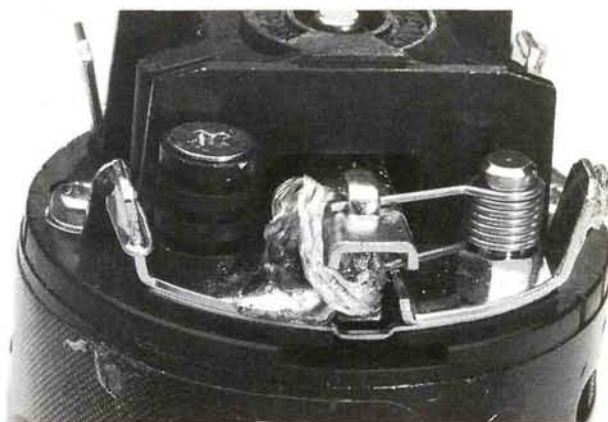
Many racers hard-wire their speed control to the motor even when they use a low-loss connector on the battery-to-ESC connection. That's OK, but you can install a connector on the motor without losing efficiency. Properly soldered, a zero-loss connector will cause no voltage loss and give you the ability to change your motor quickly and easily in the field. This method also allows you to use a partially depleted battery pack to spin the motor after cleaning if you use the same type of plugs on your pack and motor.



Run the wires as short as you can, but keep convenience in mind; the leads on this Corally could have been strung diagonally across the cells, but that would have made pack changes a real hassle.

THE POWER-LEAD-TO-MOTOR-BRUSH CONNECTION

OK, you're getting close to the end of the delivery system here, so listen up! If the big, thick lead wires are delivering all this juice to the motor, how well are all of those electrons going to get down the motor's brushes when you've got the brush leads *screwed* to the endbell? Remove the screws that secure the brush leads to the brush hoods and solder the leads directly to the endbell right next to the brush hood. If the leads are long enough, you should solder them directly to the endbell tabs where you connect the motor leads. You'll minimize resistance between the endbell and the shunt, increase system efficiency and lower the operating temperature of the brush. Remember, resistance results in heat, and heat is a brush's worst enemy.



This Team Orion mod features factory-soldered brush leads.

THE MOTOR-BRUSH-TO-COMMUTATOR CONNECTION

This is it: the final step, when all of your hard work pays off. But wait, the energy that you've routed through the pipeline as efficiently as possible is coming up against the electronic equivalent of a brick wall! If the connection between the brush face and the commutator's surface is smeared with old comm drops or is otherwise dirty, there's no way you're going to have a smooth, efficient power delivery. The fast guys—and I mean the *serious* modified pilots—clean and true their motor commutators after every race. Even the folks who run regularly in Tamiya's TCS National event re-dip their closed-endbell 540 motors after each run to flush out the junk and shine up the comm. That's because they know that the best battery packs and ESCs aren't worth your trouble if your motor's comm is

filthy. While I don't expect you to true up your motor's comm after every heat, it's certainly a good idea to check the commutator surface after each run.

ONE FINAL CONNECTION

Take a moment to inspect the wiring harness used on your car or truck. Do you have old, frayed wires or corroded connector plugs that are kinking up the power-delivery pipeline? Are there dull, sloppy solder connections on your motor or ESC? Are the wires you're using large enough to provide a sufficient flow of voltage to your motor, or so small that they bottleneck the system and introduce power-robbing resistance? It doesn't take a long time to fix this stuff, just a little knowledge. Your incentive is increased performance and run time when you keep that pipeline open!

**Addresses are listed alphabetically in the Index of Manufacturers on page 209. ■*

Compagnucci's spark ignition MAC .40 engine

In the March issue, I mentioned a new car I had found at the latest Chicago Hobby Show. Manufactured by a company called Compagnucci, the car is interesting because of its .40-size powerplant that features spark ignition like a full-scale car's, and because it uses a spark plug instead of a glow plug. The interest generated by that early "news flash" was huge, and I'm glad to report that the car is now being imported by MRC/Altech Marketing*. Following some preliminary testing, I thought I'd give you guys an up-close look at Compagnucci's MAC Series .40-size engine.

Since gasoline just doesn't put out power the way alcohol (glow fuel) does, Compagnucci has compensated by doubling the displacement of its gasoline ignition engine; that's why it has .40ci, compared with the normal .21ci for 1/8-scale glow engines. There is, however, one really trick feature about the engine that I was unaware of until I looked more closely: with a mere change of needle valves, the engine can

also be run on glow fuel in combination with the spark ignition. In my book, being given this alcohol option with such an easy modification certainly widens the appeal of the MAC .40 Series.

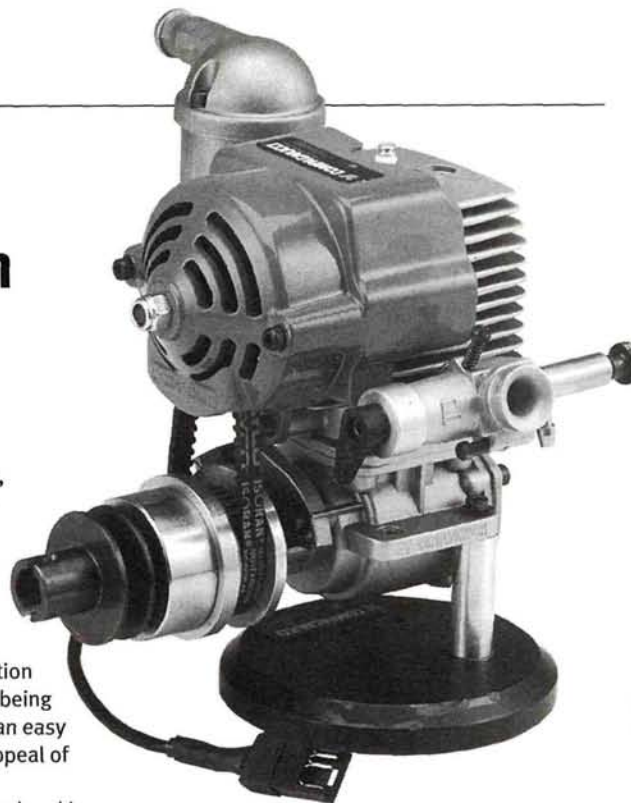
My piston-loving buddy Steve Pond and I put the Compagnucci car through its paces on both gasoline and alcohol and, while hard data won't be available until the full "Thrash Test" is

finished, it appears that Compagnucci's claim of 50mph on 87-octane gasoline is quite realistic. Running on glow fuel, however, is an entirely new game. Using 15-percent-nitro

DuraTrax fuel, we had the MAC .40 screaming, and this was without a tuned pipe—just the stock expansion chamber muffler. If Compagnucci offers tuned-pipe and gearing options to take advantage of the high-rpm horsepower provided by the alcohol option, this car will be one mean street machine. If 1.3hp @17,500rpm is claimed with gaso-

line and stock muffler, 2hp and more should be no problem with alcohol and a tuned-exhaust system. Make no mistake, though: a field of Compagnucci cars run on gasoline will still make for some very fast

At right you can see that the crankshaft has no internal port like a glow engine. Rather, the fuel mixture is introduced into the crankcase directly from the carburetor via the piston port, shown on the side of the cylinder case at left.



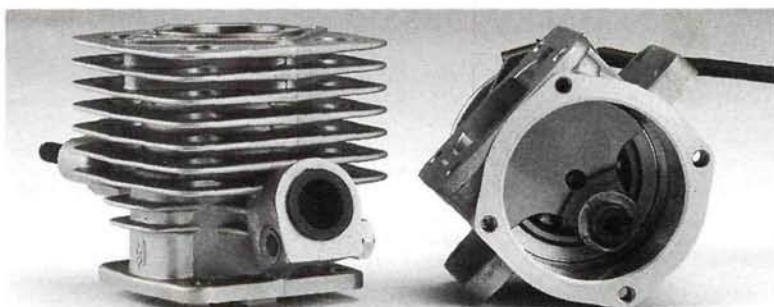
The cylinder head is a 2-piece affair with a cast body

and a machined-aluminum button insert with hemispherical combustion chamber and tapered "squish" area.



The carburetor is a simple "air-bleed" type with a single high-end needle valve. The low end is adjusted by controlling the air (hence the name air bleed), with the screw at the bottom of the carb body. The really cool part is the high-end needle-valve choices. On the right is the gasoline needle, and on the left is the optional glow fuel (alcohol) needle.

The sleeve is hardened steel, while the aluminum piston features a pinned compression ring. Don't forget, guys; a ringed engine needs more break-in time than an ABC-type piston and sleeve. Follow the instructions to the letter, don't rush this important process and you'll be rewarded with a good running, very long-lasting engine. The connecting rod is machined from bar-stock aluminum and features one oil hole at the wristpin end and three at the larger crankpin end. Only the bigger end is bronze-bushed. The wristpin is held in the piston with C-clips.



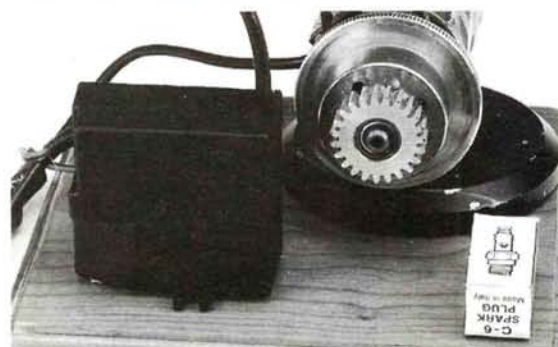
PISTON POWER

and challenging action. And it will be a lot less expensive!

Unlike standard glow engine practices, induction on this engine is of the piston-ported (or side-ported) type—much like that found on



The black box contains the Hall effect sensor, which can be moved for timing changes by loosening the two hex nuts.



The black case contains the electronic ignition that's told by the Hall-effect unit when to send spark to the spark plug. The spark plug is basically the same as used in automobiles only much, much smaller.

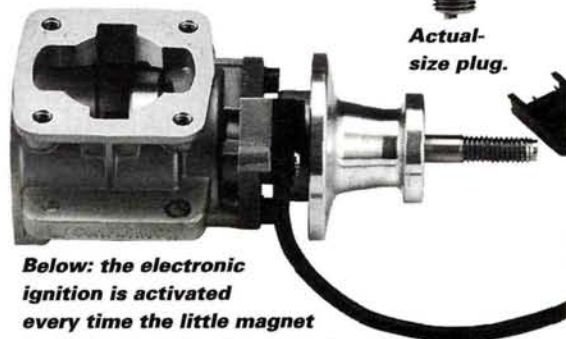
go-cart or snowmobile engines—instead of inducting the fuel mix via a crankshaft port. Ignition is handled electronically, and timing is adjusted manually. Another interesting feature is the forced-air, fan-shroud cooling that's similar in principle to that found on air-cooled Volkswagen engines. The crankshaft is supported by two ball bearings, much as a glow engine is.

Overall quality, casting and machining is excellent, but I would like to have seen Compagnucci follow through by putting a bronze-phosphorus bushing on the wristpin end of the connecting rod as was done on the crankpin end. Other than that, Compagnucci did a fine job creating

this new-style engine. Broken in properly, it should run reliably and last a long time, and it should offer quite a lot in the performance arena if the proper



Here you can see the simple belt-drive cooling fan that is driven off the crankshaft. This ducted-fan system really earns its keep by pushing lots of cooling air.



Below: the electronic ignition is activated every time the little magnet in the back of the thrust washer (1) passes by the Hall-effect sensor that's mounted on the crankcase (2).



tuned-pipe and gearing combinations are offered. Who knows? Compagnucci may have started an entirely new form of ignition racing with the MAC .40 Series. And isn't that one of the things that

keeps our hobby exciting?

*Addresses are listed in the Index of Manufacturers on page 209.

General Importer, Wholesaler & Service Center for U.S. and Canada

PRECISION MODEL DISTRIBUTORS®

205 Barnhill Road, Ladson, SC 29456

● Phone: (843)875-5454

● FAX: (843)875-5465

3 Detailed Colored Catalogs and Price List Package \$18.00

(Includes \$20.00 Rebate Certificate)

WEDICO
Way to go!
WEDICO



at 1:16 Scale
Full R/C or
Static Aluminum,
Stainless Steel
and Aluminum
Die Cast

The truck is 23" long.

VISA

MasterCard

thrash

TEST

EXCLUSIVE

1/10 scale electric



Corally C4 Touring

by Peter Vieira

Is there any performance-oriented R/C manufacturer left that doesn't offer a 4WD electric touring car? Think hard; there's one highly notable (if not well distributed) maker who, until now, has not dipped a toe into the fast-running touring-car waters. The esteemed company in question is Corally, the Holland-based mark responsible for some of the most truly innovative 1/10 and 1/12 on-road racers ever to wear foam tires. The latest car to emerge from its design department is the C4: the first sedan platform to sport the Corally* logo. Is it just another touring car, or something we haven't seen before? If I know Corally, I'll bet it's the latter. Turn the page to see more of the C4.

Dutch MASTER



s p e c s

SCALE 1/10
LIST PRICE Not yet determined

DIMENSIONS (chassis only)
Length overall 13.3 in. (335mm)
Wheelbase 9.8 in. (249mm)
Width (F/R) 7.32/7.38 in. (186/188mm)

WEIGHT
Gross, RTR 3.28 lb.

CHASSIS
Type Double deck
Material Graphite

DRIVE TRAIN
Type Dual belt
Primary Pinion/spur
Drive axles Ball-and-socket-type universal
Differential(s) Ball
Bearings/bushings Bearings

SUSPENSION
Type Upper and lower A-arm
Damping Oil-filled, coil-over shocks with externally adjustable damping

WHEELS
Type 16-spoke, one-piece plastic
Dimensions 2x1 in. (50.8x25.4mm)

TIRES
Type Pro-Line V-Rage S2 compound

CORALLY C4 TOURING



OVERSIZE UNIVERSAL DRIVE SHAFTS

Once again, the C4's designers scrapped convention for an innovative approach. The dogbone ends of the drive shafts are capped to help minimize wear on the aluminum drive cup and provide a broader interface between the dogbone and drive slot. At the business end of the shaft, an MIP CVD-like pivot is enclosed by a large-diameter aluminum stub axle that incorporates the 12mm drive hexes—no separate hexes to lose or pins to fall out. Once the axle has been slid through the hub, a wire snap ring secures it to prevent it from wandering in the bearings. Also trick: instead of using a threaded, protruding axle to secure the wheels, the hubs are threaded to accept button-head screws. I can't say that there's a performance benefit, but it sure looks cool.

"CONTINUOUSLY ADJUSTABLE ONE-WAY BEARING"

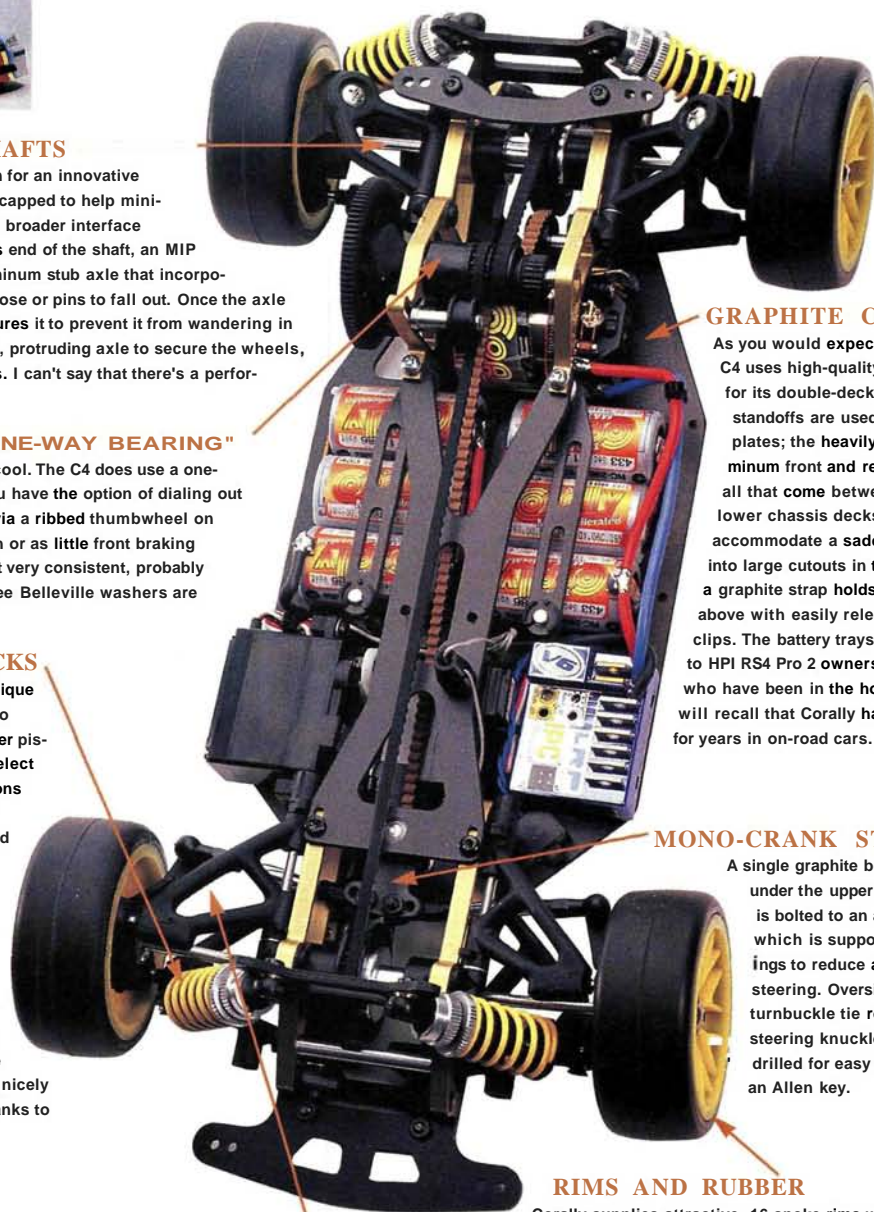
OK; so the name lacks panache, but the concept is cool. The C4 does use a one-way bearing in the front diff's layshaft pulley, but you have the option of dialing out all free-wheel action or setting it for "limited slip" via a ribbed thumbwheel on the layshaft. The setup allows you to dial in as much or as little front braking action as you wish. It works, but the slip action isn't very consistent, probably because there aren't any slipper disks, and only three Belleville washers are used as the thrust spring.

EXTERNALLY ADJUSTABLE SHOCKS

The C4 sports threaded plastic-body shocks with unique adjustable pistons. The 2-piece pistons are similar to Schumacher's Vari-shock design; the movable upper piston half rotates over the fixed lower piston half to select how many holes are open on the assembly; the pistons can be set with from one to four holes open. Unlike Schumacher's setup, the C4's shocks can be adjusted without disassembling the shock; once the lower end has been removed from the suspension arm, simply pull down on the shaft to hold the lower piston half in place (it's keyed to the bottom of the shock body) and rotate the shock eyelet to adjust the piston setting. Be aware, however, that you'll need to remember what positions the pistons are in before you adjust them, and feel carefully for the detents that let you know how many "clicks" you've moved the piston. Other interesting features include nicely turned aluminum preload adjusters that stay put, thanks to internal O-rings.

TWO-BELT DRIVE TRAIN

Nothing unusual about the belt configuration, but the C4 does offer bearing-supported front and rear tension pulleys. Both are fully adjustable, but the spur gear must be removed to access the front tension pulley. Ball diffs are no surprise, but once again, Corally adds a unique touch; the diff rings are shielded by an aluminum housing that is sure to extend time between rebuilds, and O-rings press against the housing and diff ring to prevent slippage. Diff construction is otherwise conventional, and assembly is simplified by the use of preassembled thrust bearings—no stacking tiny balls onto greasy thrust washers!



GRAPHITE CHASSIS

As you would expect, the pro-caliber C4 uses high-quality graphite plate for its double-deck chassis. No standoffs are used between the plates; the heavily relieved aluminum front and rear bulkheads are all that come between the upper and lower chassis decks. Plastic trays accommodate a saddle pack and fit into large cutouts in the chassis, while a graphite strap holds the cells from above with easily released plastic clips. The battery trays will look familiar to HPI RS4 Pro 2 owners, but those of you who have been in the hobby for a while will recall that Corally has used the setup for years in on-road cars.

MONO-CRANK STEERING

A single graphite bellcrank is located under the upper deck. The crank is bolted to an aluminum post which is supported by ball bearings to reduce any slop in the steering. Oversize aluminum turnbuckle tie rods actuate the steering knuckles and are cross-drilled for easy adjustment with an Allen key.

RIMS AND RUBBER

Corally supplies attractive, 16-spoke rims with Pro-Line V-Rage S2 compound racing tires and open-cell foam inserts.

PIVOT BALL SUSPENSION

Here's where the C4 really shines. There are other electric cars that use pivot balls to support the hubs (such as the FSR Bullet and the OFNA OB-4), but Corally pulled out all the stops and enlisted the help of Serpent* to design what is essentially a scaled-down, 1/8-scale nitro on-roaders' suspension setup that will be shared with Serpent's own Impulse 10. The front upper and lower arms are thick, muscular-looking pieces that have a wide stance on the chassis. The upper arms can be repositioned on their hinge pins to alter caster, and clip-on spacers are provided to hold the desired setting. Both ends of the car feature tweak screws in the suspension arms; the front screws use an aluminum crosspiece in the bulkhead as a stop, while the rears bottom out on the chassis. Oversize pivot balls pass through the steering knuckles and are threaded into the suspension arms. By threading one ball into the arm more deeply than the other, camber is easily adjusted without disassembly. By threading the upper and lower balls into or out of the arms equally, track can be adjusted (but don't go too wide, or the dogbone ends of the axles will fall out of the diff outdrives). The rear arms are similarly beefy, and use a pair of pivot balls in the lower arm. Here, the rear pivot can be threaded into or out of the arm to adjust rear toe, or both may be dialed in or out together to adjust camber. The rear hubs are sturdy blocks, and both suspension systems operate very precisely—no slop whatsoever. When the parts do begin to wear, any slop is easily compensated for by adjusting the aluminum cups that capture the pivot balls in the front and rear hubs.

* Suspension may be adjusted easily and precisely.

- > Very smooth belt drive, with infinitely adjustable front and rear tensioners.
- > Externally adjustable shocks.
- > Clean chassis layout.

* Diff adjustments require troublesome disassembly.

* Long-shank pinions required for best gear mesh.

YOU'LL NEED

- * 2-channel radio system.
- * Body.
- * Steering servo (high speed preferred).
- * CA glue to mount the tires.
- * 6-cell battery pack saddle configuration.
- * Servo-saver, (recommended).
- * Motor.

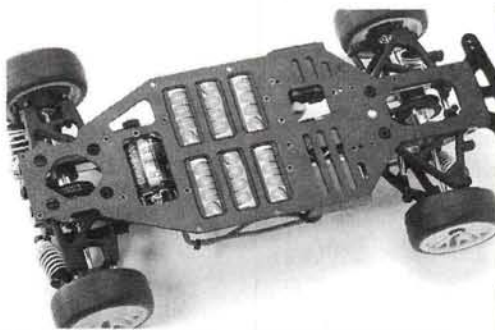
TEST GEAR

* KO Propo* Mars radio with KR297FZ receiver • KO Propo PS 2004FET servo • LRP* V6 ESC • Corally 2000mAh matched saddle pack • Corally 11-double modified motor • Protoform* Honda Accord body

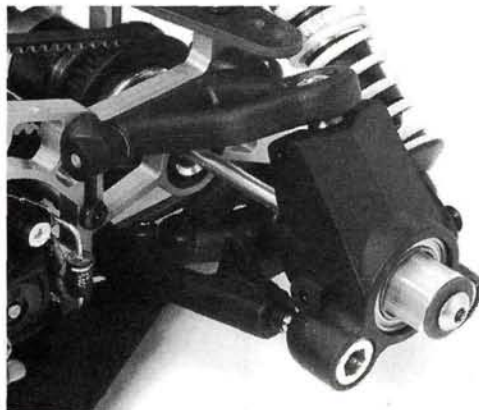
PERFORMANCE

After I allowed assistant editor Greg Vogel to drive the Corally during the photo shoot, he was so gung ho about racing it that I just had to let him grid the car at R/C Madness's next sedan race; and hey, Greg's a better driver than I am, anyway. Here's what he had to say about the C4:

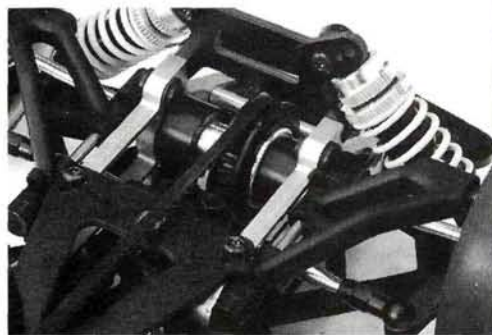
Before I took the car to the track, I swapped the stock Pro-Line tires for Yokomo's* new Beltech Sprints, new tires that have proven to work well at R/C Madness's track. Having the only running C4 in the U.S. made me a little nervous as I set the car on the starting grid. Despite Pete's reassurances that the car would be as solid as any other racer, I felt it looked a bit fragile, and I was afraid that if I whacked a corner too hard, my testing might be over for several weeks while I waited for parts to arrive from Holland! But I regained my composure and squeezed the throttle. One attribute that stood out on the bench was the free-running belt-drive system, and on the track, it was apparent that the efficient system is capable of smooth acceleration. The C4 was up to speed on the straight in no time. I let off slightly for the sweeping turn, and the Corally stuck to the track with just a tiny amount of push—hey, I'd rather have some push than have the car oversteer and loop out. Next, a quick 90-degree turn and a switchback section lay ahead of the C4. As I went through the 90, I again noticed a slight bit of understeer but it wasn't detrimental to the car's lap times. In fact, I noticed that no other cars even came close to pulling the Corally through any part of the track. The switchback was a breeze, as the car snapped like a rubber band around the turn within an inch or so of the corner dots. The C4 allowed me to put down some picture-perfect laps, but I noticed the differentials seemed to be slipping just a little, so I went back to the bench for a brief tuning session that turned out to be not so brief; I had to remove the pivot balls to get to the differential and then put everything back together and check all the suspension settings with a caliper and camber gauge. Once the parts seat themselves, you won't have to adjust the diffs again until you rebuild them, but you should be prepared for at least one trackside teardown to get them locked in. Back on the track, the car is very nimble and should fare well in the hands of average racers, though its tunability and precise handling characteristics will be easily exploited by experienced drivers as well.*



Here you can see the plastic battery trays that are fitted into the chassis as well as the gaping holes beneath the diffs that allow pebbles and grit to fall away before they can get into the belts.



There's a lot going on here; check out the aluminum bulkhead—or what's left of it after Corally machined out the unnecessary material. Also note the giant axle bearings, integral aluminum hex hub and button-head wheel bolt; trick stuff.



This view shows the front diff and reveals an interesting feature: collars are pressed into the bulkheads to hold the diff bearings and shield the outdrives. The diff outdrives do not protrude past the bulkhead, and this makes it difficult for dirt to get into the diff slots.

BUILDING S
SETUP TIPS

As happy as I am with the C4's performance, it is not a wise choice for the first-time R/C

car buyer. Experienced builders will find some of the steps troublesome at best; beginners will find them nearly impossible. Every performance advantage the C4 has will be lost if it is improperly assembled, so take your time and do it right

- Before building the car, lightly sand the chassis's edges to make handling the car more pleasant and reduce the chances of splintering. A graphite splinter in your hand is not a pleasant feeling.
- Another good before-you-begin tip: use a little bit of CA to glue metal pads onto the chassis where the rear tweak screws bottom against it. This will prevent the screws from gouging the chassis and ensure consistent tweak settings. I usually use thin brass sheet, but senior editor Steve Pond gave me a better idea: dulled pieces of a snap-off razor blade. The hard steel won't deform under the screw, and the pieces have a nice finished look. Dull the blade on fine sandpaper before you handle it.
- The torx-style fasteners offer a very positive grip, and Corally is nice enough to supply the proper torx driver with the kit. However, the torx fasteners will not tolerate anything less than a perfect fit with the driver, but the placement of the rear tweak screws requires the driver to come in at an angle. I fixed the problem by replacing the torx tweak screws with Allen fasteners that allowed easy adjustment with a ball-end Allen driver.
- The large pivot balls used on the suspension components are a handy tuning item and easily adjusted, but it can be difficult to set them so both sides are of equal lengths. If you don't have one already, now is the time to get a pair of good-quality calipers.
- Diff adjustment requires a fair amount of disassembly and suspension readjustment. Try assembling the diffs for slightly tighter-than-usual action to avoid a loose diff once the parts seat themselves.
- The kit comes with 20WT oil for the shocks; this seems light for a tourer but works well with the adjustable shocks. With the pistons set for one open hole, the shock felt comparable to an HPI shock with 2-hole pistons and 80WT oil, and softer settings were easily dialed in by selecting additional open piston holes.
- Use a small dab of Loctite* on the fasteners that screw into the aluminum bulkheads; just a little extra protection against vibration.
- Be very careful when assembling the suspension components. The instructions aren't very emphatic about noting which parts have lefts, rights, or specific positions that they must be installed in.

EXPLOSIVE C4

After building the Corally C4, listening to Greg's feedback and driving the car myself, I'm fully impressed with this exotic machine. Although the term "exotic" might conjure up images of unusual parts or obscure material choices, the C4 is actually quite conservative; every design choice seems to have been made with pure functionality in mind. Nothing has the look of "style over substance," and this, ironically, gives the C4 a style all its own. It is a true thoroughbred race machine with the performance to match its pedigree.

*Addresses are listed alphabetically in the Index of Manufacturers on page 209.

THE COMPETITION

	Corally C4	Yokomo YR4M2 USA	HPI RS4 Pro 2	Schumacher SST PRO '99
Wheelbase	9.8 in. (249mm)	9.94 in. (252mm)	9.88 in. (251mm)	10 in. (254mm)
Width	7.32/7.38 in. (186/188mm)	7.19 in. (183mm)	7.2/7.4 in. (183/188mm)	7.25 in. (184mm)
Diff type	Ball	Ball	Ball	Ball
Chassis	Graphite	Graphite	Graphite	Fiberglass
List price	NA	\$229	\$399	\$369
Available at*	NA	\$229	\$219	\$225
Reviewed in	8/99	11/98	5/99	4/99

Partial list only; product category is too large to list all competitive vehicles.

*Prices vary with location.



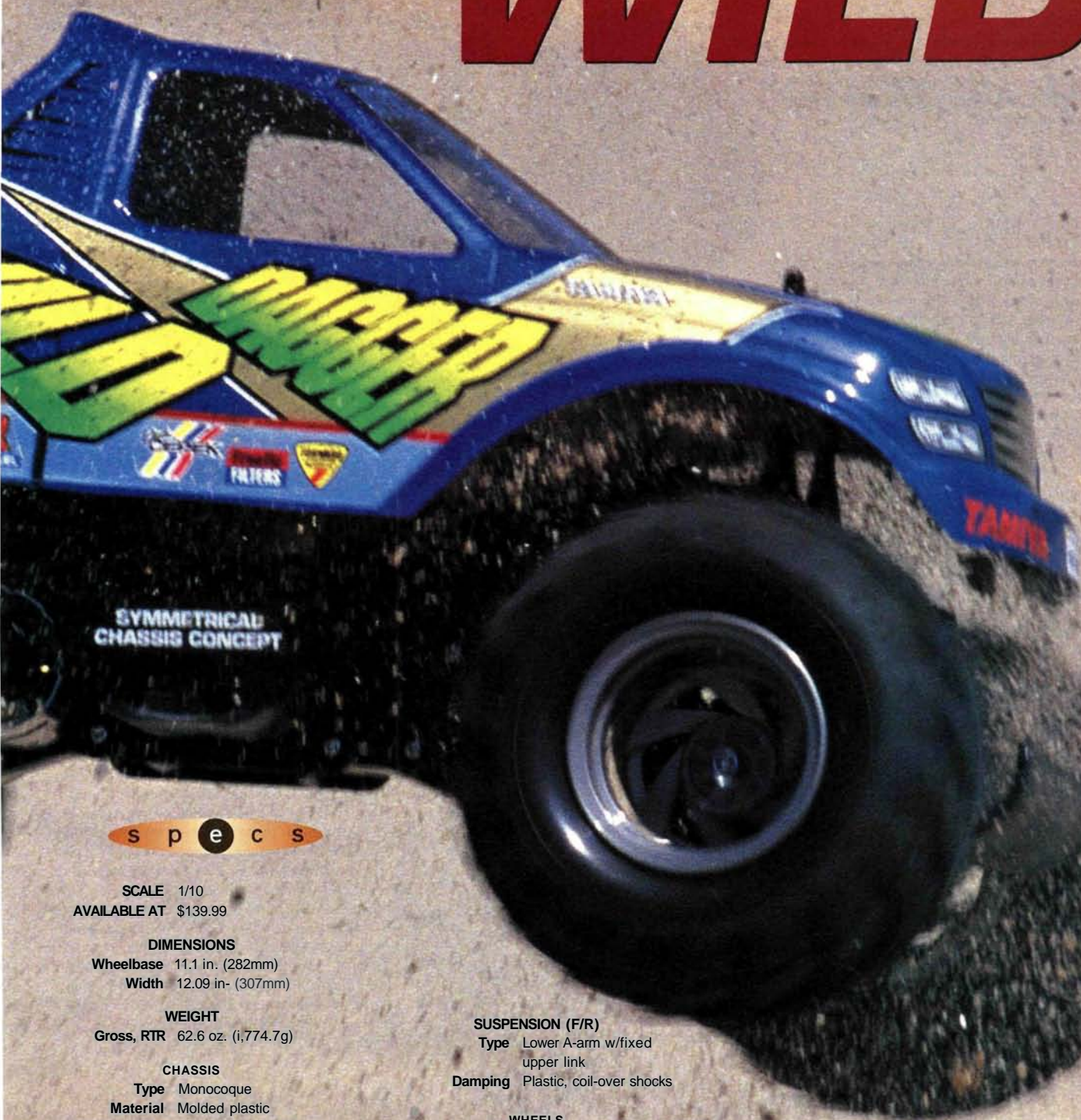
Tamiya *Wild Dagger*

by Kevin Hetmanski

NO R/C MANUFACTURER has a longer or more varied history in the truck segment than Tamiya*. From the original Subaru Bratt and Midnight Pumpkin to instant classics such as the Blackfoot and Clod Buster, Big T has always had a soft spot for flatbeds of all varieties. This year, the Japanese giant unleashed two extraordinary truck kits that represent opposite ends of the technological spectrum. On the high-tech, high-cost side, there's the Juggernaut (reviewed in our July 1999 issue)—the aluminum-chassis, leaf-spring-suspended, dual-motor update of Tamiya's ultimate monster-truck vision. At the budget end of the spectrum resides the Wild Dagger—a compelling mix of first-timer-friendly features and innovative design (and dual motors!) that should make Tamiya's latest machine appealing to truck fans of all skill levels. Ready to get Wild?



call of the **WILD**



s p e c s

SCALE 1/10

AVAILABLE AT \$139.99

DIMENSIONS

Wheelbase 11.1 in. (282mm)

Width 12.09 in- (307mm)

WEIGHT

Gross, RTR 62.6 oz. (1,774.7g)

CHASSIS

Type Monocoque

Material Molded plastic

DRIVE TRAIN

Type Sealed gear

Primary Pinion/spur

Drive shafts Dogbone

Differential(s) Bevel gear

Bearings/bushings Bushings

SUSPENSION (F/R)

Type Lower A-arm w/fixed upper link

Damping Plastic, coil-over shocks

WHEELS

Type Molded one-piece

Dimensions (DxW) 2.4x1.9 in. (60x50mm)

TIRES

Type V-shaped tread w/pin-spikes

ELECTRICS

Motor Mabuchi 540 (2)

Batteries Not included

Speed control 3-speed mechanical with reverse



"SYMMETRICAL CONCEPT" CHASSIS

The Dagger's clamshell-style chassis is very cleverly designed. Unlike Tamiya's similar TL01 chassis, which is also split down the center, the Wild Dagger's halves are not mirror images of each other with a right and a left side; the Dagger's chassis halves are identical pieces cast from the same mold. This reduces Tamiya's tooling costs, lowers the price of the kit and allows the Wild Dagger its unique drive-system layout.

DIRECTIONAL TIRES AND WHEELS

Tamiya's Super Blackfoot donated its chevron-tread spiked tires to the Wild Dagger, but its wheels are all new. The gray hoops have an attractive "twist" spoke pattern and are directional; that means they won't look "backward" on one side of the truck.

INDEPENDENT SUSPENSION

The current crop of dual-motor trucks all uses solid axles suspended via trailing arms, but the Wild Dagger breaks away with a fully independent setup that features two-piece lower A-arms and fixed upper links. The parts have a little flex in them, and this will help prevent breakage; good thing, 'cause the Wild Dagger just begs to be driven hard. Friction shocks are included to handle bump-absorption duties. Paradoxically, the instructions call for large external shock spacers that severely limit shock travel. There appears to be plenty of room for the suspension arms to swing without ejecting the dogbones or interfering with any hard parts or the body, so the limiters are a mystery.

DIRECT-LINK STEERING

The Wild Dagger eliminates conventional bellcranks in favor of threaded tie rods that join the kit-supplied servo-saver directly to the steering knuckles. There is just slight bump-steer in the setup, mainly because there's only slight suspension travel.

YOU'LL NEED

- 2-channel radio system.
- Two servos, or a servo and an ESC.
- 6-cell stick battery pack.
- Polycarbonate-compatible paint.
- Charger.

FACTORY OPTIONS

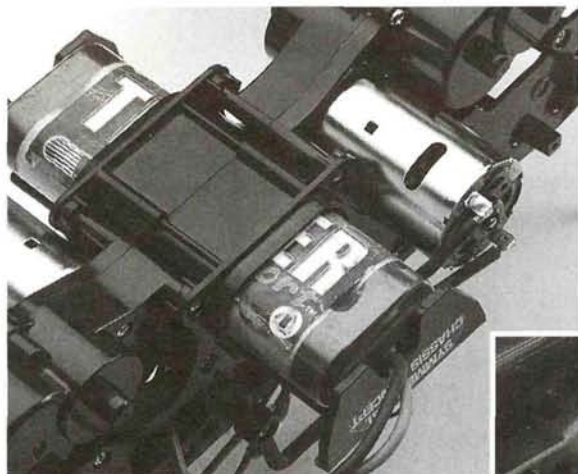
- Low-friction aluminum damper set—part no. 53155.
- Sealed ball-bearing set—53008.
- Pinion gear set, 20T, 21T AV—50356. (Note: 21T pinion not compatible with Wild Dagger.)

DUAL-MOTOR 4WD SYSTEM

Closed-endbell 540 motors aren't known for scintillating performance, but when you have two of them installed in a lightweight chassis, it's a good recipe for snappy acceleration and tons of torque. The motors are bolted into the gearboxes through holes labeled according to pinion size; 18-tooth pinions are supplied, and an additional set of motor-mounting holes will allow you to use a 20-tooth pinion. The motors send the spin through two identical gearboxes; once again, that means fewer unique parts must be designed and tooled up for, and that helps keep production costs low. Each gearbox encloses four bushed gears and one of Tamiya's bombproof 3-gear diffs. Plated-steel dogbones get the power to the wheels, and plastic bushings keep everything rolling smoothly, or at least they will for a while! When the bushings get sloppy, go for bearings. Better yet, pick up a set before you build the kit, and skip the bushings altogether.

PERFORMANCE

With a fully charged battery, I headed out to the backyard to give this truck a good beating. Right away, I was impressed with its quick acceleration and quick steering. With four paws grabbing, the Dagger surges ahead without wasting power on wheelspin, and it turns in hard. I immediately steered into the woods for some classic "backyard bashing." The Dagger easily tackled all objects that got in its way. I was particularly surprised at how well it climbed over rocks; line it up with the

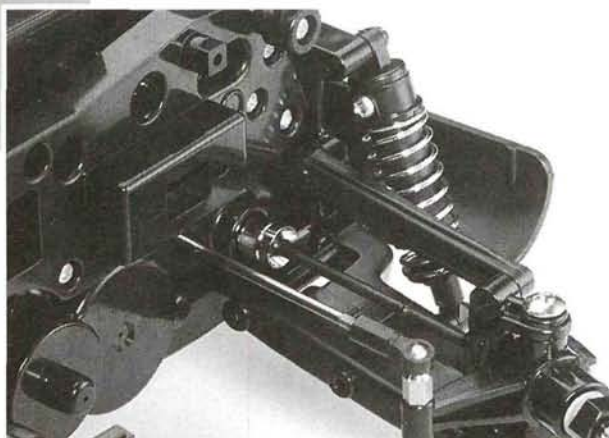


Above: the twist-pattern wheels are directional so they won't look "backward" on one side of the truck.

Left: a quick-release tray makes it easy to change packs. Note how close the motors are to the battery.

offending hunk of mineral, roll on the throttle, and the Wild D just squirts over every time. After tooling around the yard for a while, I charged up a few more packs and headed to JP's Hobbies and Raceway in scenic Derby, CT. The off-road track was under renovation and was little more than a big, open dirt pit with jumps all over the place: perfect monster-truck territory! The well-balanced chassis setup really showed its stuff here. The gyroscopic effect of the Dagger's four powered wheels made it easy to adjust its attitude in the air, but the friction shocks don't offer enough rebound damping to plant it on touchdown; get some decent air under it, and you'll see just how wild it gets when it lands.

The track's partially finished whoop section also highlighted the insufficiency of the damping. The rear end was all over



Left: fixed camber links make setup a no-brainer and guarantee you'll never suffer from a stripped ball joint. The steering knuckles and hub carriers are TL01 pieces.

Below: this underside shot highlights the ample bumpers and two-piece suspension arms. The arms are well suited to off-road action because they have no nooks or crannies to hold dirt.

the place, making it hard to stay in a straight line. The Dagger, however, always stayed shiny side up, and a little extra "drama" isn't necessarily a bad thing in a play truck.



BUILDING & SETUP TIPS

- Be careful not to overtighten the screws. The soft plastic that increases the kit's durability also increases the likelihood of stripping the screw holes. Tighten until you feel resistance and no more.
- Before you neatly arrange and secure the wiring, power up the truck and blip the throttle to confirm that you have properly connected the motors for correct rotation.
- Although the instructions tell you to grease the ends of the dogbones, you are better off leaving them dry; grease will attract dirt and grit, which will cause far more wear than leaving the bones unlubricated.
- Make sure that the steering servo's output shaft is in the neutral position before you install the servo-saver and join the chassis halves. If you skip this step and need to gain access to the servo to reposition the saver, you will have to remove a lot of screws.
- When you lubricate the gears, use only a little grease; a "dot" on each gear is plenty. Too much grease can increase resistance.

TAKE A STAB AT IT!

My overall impression of the Wild Dagger is very good. Anything with big tires and two motors equals fun in my book, but there's usually a premium to pay; the other dual-motor trucks out there (Tamiya's Juggernaut and Clod Buster and Kyosho's USA-1) aren't exactly cheap. The Wild Dagger, on the other hand, is downright affordable. Couple the low price of admission with ease of assembly, and it's easy to peg the Dagger as a great first truck for any beginner. And it's also a great third, fourth (tenth, 100th ...) truck for the seasoned vet!

* Addresses are listed alphabetically in the Index of Manufacturers on page 209.

- Twin motors and 4WD deliver exciting performance.
- Symmetrical chassis design reduces parts count and simplifies assembly.
- Usual Tamiya good stuff: excellent instructions, high-quality parts, super body and graphics.

- Pins in axles fall out easily and instantly disappear into the Land of Missing Hardware.
- Limited suspension travel when assembled "by the book."



dislikes



OFNA Nitro Colt Mini

by Peter Vieira



It's kind of like when you were a kid and you'd draw the freakiest-looking, goriest monster your sugar-addled brain could conjure, only to have your mom say, "How cute!" and stick it on the fridge with a Snoopy magnet. You wanted her to be shocked; instead, you got a cookie. Likewise, you want onlookers to be a little scared of your R/C rig. You want them to shudder at its speed and aggressive handling. You would like them to think, "Whoa! That's no toy!" Minis, however, seem to always come across as cute no matter how rip-snortin' they are. OFNA's* Nitro Colt Mini (NCM) is no exception. You have to smile when this bug-bodied nitro nugget whips by, even if its 30mph top speed is nothing to laugh at. Let's check it out.

s p e c s

SCALE 1/10
LIST PRICE \$299

DIMENSIONS
Wheelbase 8.18 in. (208mm)
Width 6.1 in. (155mm)

WEIGHT
Gross, RTR 43.9 oz. (1.244.5g)

CHASSIS
Type Aluminum plate
w/plastic upper deck

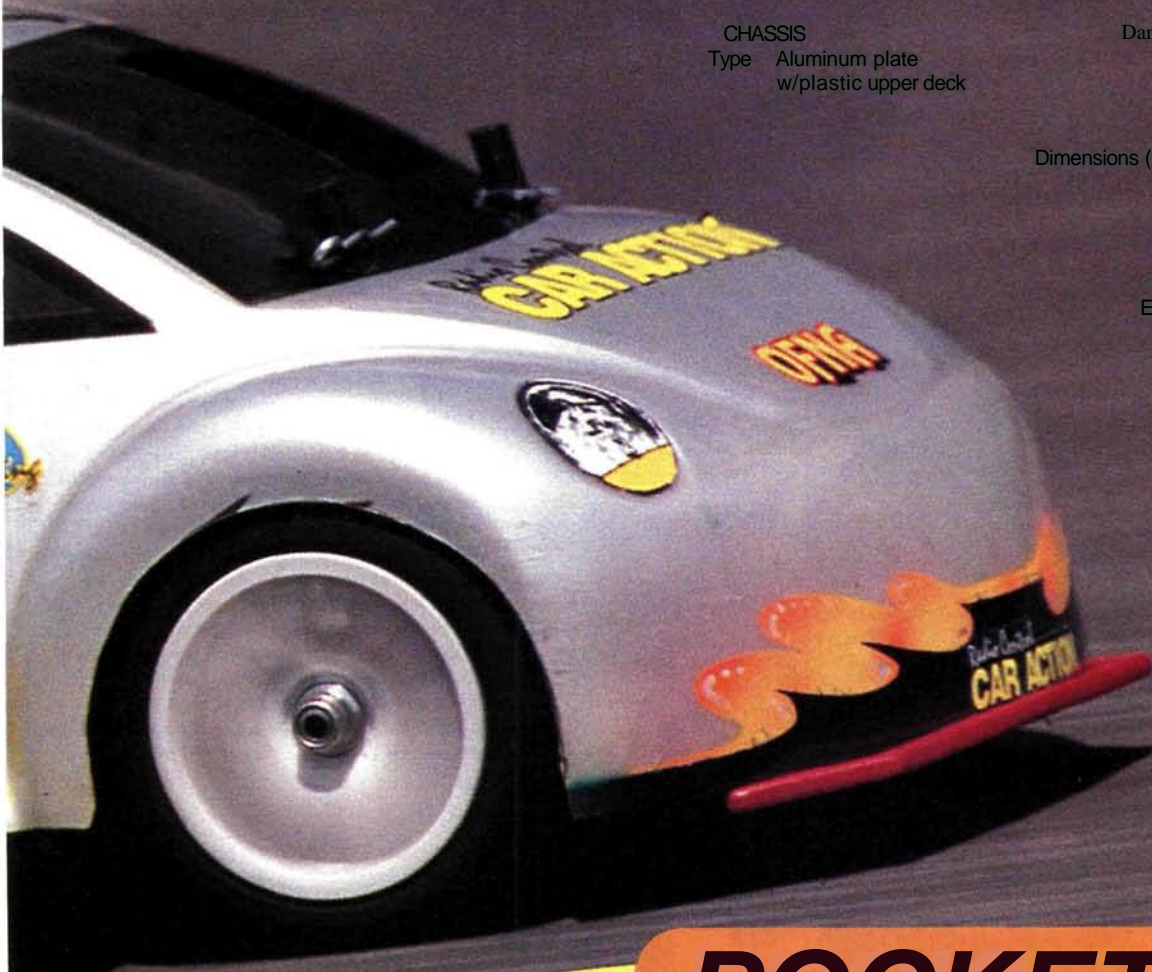
DRIVE TRAIN
Type Belt-driven 4WD
Primary Clutch bell/spur gear
Drive axles Dogbones
Differential(s) (F/R) Ball
Bearings/bushings Metal bushings

SUSPENSION (F/R)
Type Lower arm w/molded
upper links
Damping Plastic body, oil-filled
shocks

WHEELS
Type One-piece plastic
Dimensions (DxW) 1.65 x .98 in. (42 x 25mm)

TIRES
Type Mini radials

POWERPLANT
Engine Force .12 w/pull-starter
Pipe Expansion muffler
Carb Rotary



POCKET PERFORMER





RED-ANODIZED CHASSIS

The highlight of the Nitro Colt Mini is certainly the sharp-looking, red-anodized 2mm chassis. Although 2mm might seem a little thin, the small chassis doesn't really need to be any thicker. To stiffen the chassis around the motor-mount area, the sides are slightly radiused. The underside is fully countersunk with the exception of the engine-mount screws, but extremely low-profile fasteners are used to minimize the chance of pavement snags. A plastic upper deck is connected to the chassis by molded-in standoffs, and it provides just enough space for standard-size steering and throttle servos, a receiver pack and a chunky receiver. If you plan to run the NCM with an inexpensive AM radio, your gear should fit just fine.

3-BELT DRIVE TRAIN

Granted, there are only so many ways to incorporate a nitro-powered 4WD system into a mini-size chassis, but it's hard to miss a certain, ah, resemblance to the HPI Nitro Mini RS4 when you check out the NCM's drive train. The design is so close, in fact, that HPI's Nitro RS4 series belt tensioner fits the OFNA car. Although the NCM cops the HPI mini's belt layout, it does have its own twist on the individual parts. There are fewer parts, for starters; the front and rear bulkhead halves incorporate camber-link mounts instead of using separately attached pieces, and the layshaft support is molded into the rear bulkhead. Ball diffs equip both ends of the car, dogbones join them to the stub axles and bronze bushings are used throughout. The drive train binds pretty badly out of the box, but I expect a few break-in runs to free things up to an "acceptable-for-bushings" degree.

YOU'LL NEED

- 2-channel radio set.
- Steering and throttle servos.
- AA batteries or Ni-Cd receiver pack.
- CA glue.
- Polycarbonate-compatible paint.
- Fuel.
- Glow-plug igniter.

FACTORY OPTIONS

- Swaybar kit (1.8mm/2mm)—part nos. M1020/M1020A.
- Belt tensioner—M1023.
- Aluminum shocks (F/R)—CL3101/CL3102.
- Hard-anodized 3mm chassis—M1021.
- 2-speed transmission—M1024.

FIXED SUSPENSION

The tiny suspension arms required by minis make it difficult to squeeze in threaded camber links, so the NCM is excused for not having them. Who wants to mess with camber changes on a play-around car anyway? The front A-arms use C-carriers to support the steering knuckles that pivot on metal bushings.

Unfortunately, when the front suspension is compressed, the hub carriers bang into the front shock tower before the shocks bottom out. I suppose you could argue it really doesn't matter if the suspension bottoms at the shock or the tower, but I encountered problems during testing when the hub carriers whacked the shock tower hard enough to snap it.

FORCE .12 ENGINE

The NCM arrives 90-percent assembled and the good-looking Force mill is already installed and ready to go when you open the box. It has some nice features, including an anodized heat-sink head with a separately machined glow-plug "button," two-needle rotary carb, O-ring sealed backplate and a unique pull-starter. Unlike most recoil starters, which require the crank to constantly spin a power-robbing drive dog and one-way bearing, the Force powerplant features a spring-loaded pin that engages a ramp that is machined into the face of the pull-starter's drive plate. With the Force starter setup, there's no power drain because of the pull-starter. An expansion chamber muffler keeps things quiet and uses a silicone stinger tube to route exhaust gases out from the rear of the car, and a 75cc fuel tank prevents the engine from getting thirsty.

BELLCRANK STEERING

The right "bellcrank" is actually the servo horn and incorporates a servo-saver. The steering servo mounts upside down, and a wire drag link joins it to the left bellcrank (once again, this is a lot like HPI's mini setup). Threaded rods are used to allow steering toe adjustments.

ROUND STUFF

Naturally, the NCM sports mini-size tires and rims. Firm compound radials with soft foam inserts are mounted to 12-spoke hoops. The wheels use sedan-standard 12mm hubs, so the NCM can accept other popular wheel and tire combos.

PLASTIC SHOCKS

I'm a card-carrying member of the "nothing-wrong-with-plastic-shocks" club, but I'm not in love with the NCM's oil-filled units. They look just plain cheesy with their slim bodies and toyish red color. As assembled by the factory, damping action could be smoother. I'm sure a rebuild would help, but that defeats the purpose of a factory-built kit. As soon as you have an excuse to tear 'em down, do it. Better yet, upgrade to OFNA's optional blue aluminum units. On the plus side, the bodies are threaded for easy preload adjustment.

PERFORMANCE

My previous experience with Force engines was limited to .21 powerplants that required thorough sealing before they would maintain their settings and idle properly. The NCM's .12 mill engine required no such attention; it started on

the first pull and idled smoothly once the needles were properly tweaked. After I trimmed out the car and buzzed through a couple of rich tankfuls in the *R/C Car Action* parking lot, I was ready to lean out the settings and see what the car could do. I was surprised by the squirt the car had off

TEST GEAR

- KO Propo * EX-5 radio and KR-293A receiver • KO Propo PS401 throttle and steering servos
- Blue Thunder* 20 percent Race Fuel • Dynamite Power Pack 600mAh receiver pack

OFNA NITRO COLT MINI

the line; I didn't expect an inexpensive engine to propel a bushing car with much gusto, but the NCM definitely had grunt. The Force engine rolls on the power smoothly all the way up to full throttle, which was good for a top speed of 30.1mph. If that doesn't sound fast, trust me, it is. At speed, the NCM can be a handful to drive due to its high center of gravity, narrow track and the tires' small contact patch, but that's typical of all minis. You'll need to back off the gas to get around tight turns, but if you just want to hot lap a parking lot, the NCM is plenty stable on those high-speed sweepers.

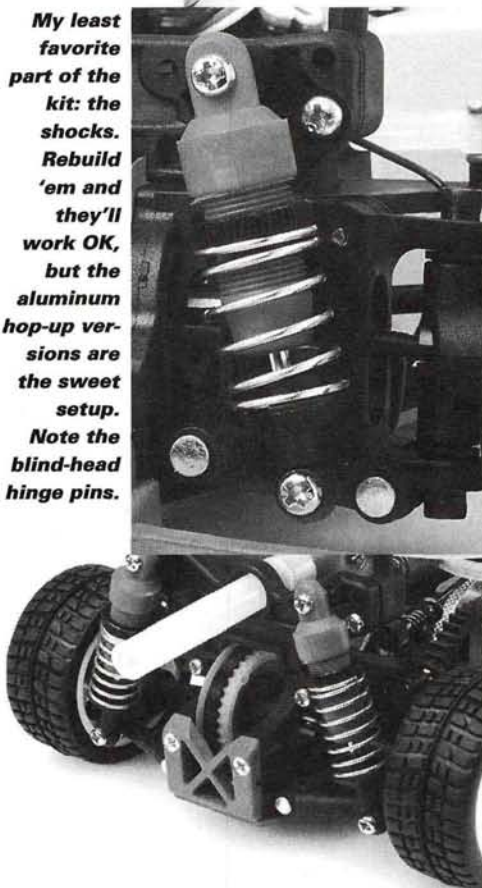
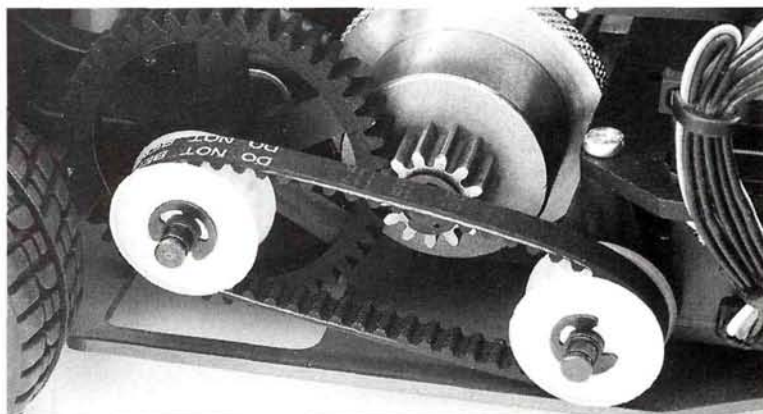
The front shock tower proved to be a weak link when it snapped due to a low-speed curb graze, but the rest of the car proved quite durable. During the photo shoot, the receiver pack began to dump and I urged our photographer, Walter Sidas, to take a break so that I could change the pack. Sun was a precious commodity, however, and as clouds stood ready to blot out the light, Walter kept asking for one more pass.

The receiver pack had barely enough juice to straighten the wheels and close the throttle, but I got the car past the camera one more time. Then, right on cue, the pack gave up its last volt and the mini took off like a curb-seeking missile. When it found the end of the parking lot, the slightly beveled curb shot the NCM about five feet into the air and into some shrubbery. The car was screaming wide open for a good half minute before I could extract it and shut it down. At that point, every inch of the engine was steaming, and I could detect the acrid smell of burnt castor oil.

I thought for sure the Force engine would never start again, but after cooling, it burbled along just fine. The impact and

You can see the radiused edge of the chassis beneath the outboard drive belt. The extended layshafts are ready to accept OFNA's optional tensioner.

My least favorite part of the kit: the shocks. Rebuild 'em and they'll work OK, but the aluminum hop-up versions are the sweet setup. Note the blind-head hinge pins.



The exhaust is routed through the shock tower via a silicone stinger. The diff is just hangin' out there in the wind, but no contamination problems were encountered.

overheating seemed to create an air leak that caused a bit of bog-down at low throttle, but reliability did not suffer—tough stuff.

- Easy starting.
- Fast out of the box.
- Fun to drive.



Likes

- Drive train binds.
- Front hub carriers strike the shock tower.
- Cheesy shocks.



dislikes

THE COMPETITION

	OFNA Nitro Colt Mini	HPI Nitro Mini RS4
Wheelbase	8.18 in. (208mm)	8.8 in. (224mm)
Width (F/R)	6.1 in. (155mm)	6.2 in. (157mm)
Weight	43.9 oz. (1,244.5g)	49 oz. (1,389g)
Chassis	Aluminum/plastic	Aluminum/plastic
Differential(s)	Ball	Bevel gear
Bearings/bushings	Metal bushings	Metal bushings
Shocks	Plastic oil-filled	Plastic oil-filled
Engine	Force .12 pull-starter	HPI Nitro Star FE .12
List price	\$299	\$299
Available at	\$179	\$199

*Prices vary with location

BUILDING & SETUP TIPS

■ Thoroughly wash the tires and rims before gluing. I had a hard time getting the treads to stick without a denatured alcohol rubdown (for the tires, not me).

■ The fuel tank's pressure fitting faces out from the chassis, and the body pinches it against the side of the tank. You could fix this by turning the tank around, but then the fuel would slosh away from the pickup under acceleration, leading to bogging when fuel gets low. The best fix is to relocate the pressure fitting to the other side of the tank. Just drill a hole in the undrilled boss on the opposite side of the tank, remove the fitting and re-install it in the new hole, then seal the original hole with a screw and sealant.

■ Some NCM kits, like my early production sample, have the steering tie rods mounted on the upper sides of the bellcranks and steering knuckles, where they may interfere with the upper deck. Relocate them to the underside of the bellcranks and knuckles for bind-free operation.

■ Keep the engine rich during break-in and run through a few more tanks of fuel than usual. The drive-train bushings will take longer to break in than the engine, and the extra fuel will help keep the engine cool as it does the extra work.

■ Install travel limiters on the shocks between the bodies and spring perches to prevent the hub carriers from striking the shock tower. A 2mm section of fuel tubing or two O-rings on each shaft will do the job.

THE VERDICT

Although it has some rough spots—most notably the fragile front shock tower and lame plastic shocks—the Nitro Colt Mini grew on me. Most of the credit goes to the willing engine; its speed and reliability allowed me to forgive the less polished parts of the kit. I had so much fun driving it that I was looking forward to fixing the problem areas and really making the car sing rather than damning it for its weaknesses. I would be happier with the car if the problems had been fixed at the factory, but in the meantime, I plan to fix the front shock tower, limit the suspension travel, add a bearing set and have a lot more fun with the Nitro Colt Mini.

*Addresses are listed in the Index of Manufacturers on page 209.



by Derek Buono

CEN's* name may not ring a bell with many of you, but it has been in the R/C industry for years. It may become familiar to you soon, however, with the release of its new GX1 EP.

CEN recognizes the influx of newcomers who aren't tuning professionals, but are looking for high-quality cars that can withstand the rigors of street racing and perform respectably on the track. The GX1 is a prebuilt electric touring car (TC) designed to perform well right out of the box. It includes some great features, such as aluminum shocks, adjustable tie rods and a full ball-bearing set. Does this car have the durability and performance you're looking for to hang in the world of 4WD touring? Let's find out.

CEN GX1 EP



PHOTOS BY WALTER SIDA'S

CLOCKWORK

s p e c s

SCALE 1/10
LIST PRICE \$199

DIMENSIONS
Wheelbase 10.12 in. (257mm)
Width (F/R) 7.67 in. (196mm)

WEIGHT
Gross, RTR 52.8 oz. (1,496.8g)

CHASSIS
Type Double-deck
Material Fiberglass

DRIVE TRAIN
Type Single belt
Primary Pinion/spur
Drive shafts Metal dogbones
Differential(s) Gear
Slipper clutch None
Bearings/bushings Bearings

SUSPENSION (F/R)
Type Lower A-arm w/adj. camber link
Damping Aluminum-body, oil-filled shocks

WHEELS
Type Standard sedan
Dimensions (DxW) 1.9x1 in. (48.26x25.4mm)

TIRES
Type Treaded sedan

ELECTRICS
Motor 540-size stock
Battery Not included
ESC Not included



ORANGE



JAGER-BODY

Several body styles are available. The BMW 320i included with this kit looked awesome decked out in the official Jagermeister sponsor set. I managed to scam a factory demo body painted and stickered; I think you'll agree it looks absolutely fabulous. Along with a full sticker sheet, mirrors and wipers are included to give a detailed realistic look. There were also body-post markings to ensure proper mounting.

SINGLE BELT/GEARBOX DRIVE TRAIN

The GX1 uses a very efficient, low-friction, single-belt design. The belts are connected to front and rear 3-gear transmissions where the power is dispensed to all four wheels through metal dogbones. The entire drive train is fitted with smooth ball bearings. Bevel-gear differentials are included with this version of the kit, but ball diffs are an option, as are universal shafts.

BEARINGS EVERYWHERE

A full set of ball bearings for the drive train and hubs is included. This is not something I usually get excited about, since most racer kits come with bearings, but CEN has included ball bearings as standard issue for the steering and the tension pulley on the GX1 kits—a feature offered on few other entry-level kits.

SUSPENSION

The GX1's suspension arms may not be very stiff, but try to break one; it won't be easy. Softer plastics like the type used for all of this car's suspension take an enormous amount of abuse; its flexibility, however, tends to hinder handling consistency. An adjustable upper tie rod allows camber adjustments.

INCLUDED MOTOR

A 540-size stock motor gets you rolling right out of the box—not a team-quality burner, but much better than the closed-endbell motors that come with some other sport kits. This motor allows brush and spring changes for tuning and maintenance.

FIBERGLASS CHASSIS

The double-deck fiberglass chassis with countersunk holes flexes a bit too much for my liking. A quick upgrade—the optional carbon-fiber chassis—would solve this and greatly increase handling consistency while making the GX1 capable of ripping some faster laps. For most GX1 owners, however, the stock chassis will be more than adequate.

ALUMINUM, OIL-FILLED SHOCKS

All four corners are damped aluminum shocks that provide the smooth operation required for consistent handling. Typical double O-ring seals are in the bottom of the dampers. The anodized purple shock caps add an extra flair. A set of quick-adjust shock spacers is included to ensure equal tension and ride height. The pre-built shocks had a problem that I've only heard associated with CEN cars: sticky shocks. It seems that if you let the shocks sit for a while, they stick in one position until you push them up and down a few times to break them free.

ROLLING STOCK

Treaded radial tires are mounted on spoked wheels. The tires are fairly hard, and that should help them wear well.

BUILDING & SETUP TIPS

The stock, out-of-the-box setup is an adequate starting point, but I highly recommend a suspension-tuning session to make a rock-solid performer out of this capable car. Here are a couple of suggestions.

■ Ditch the stock oil and springs and buy some Tamiya springs (blue for all four) and some silicone oil such as Losi Certified 40WT, and use Associated* Green Slime lubricant on the O-rings. This will help cure the sticky shock problem that both Peter Vieira and I have experienced while running CEN cars (see "CEN SP1 Thrash Test," March 1999).

■ The kit tires work well on just about any parking lot; just glue them on so they don't roll off the rims.

■ If you use the kit motor, put a drop of motor oil on the bushings before use.

■ The stock steering tie rods were set to a length that gave the car toe-out. Unscrew the ball ends a little until you have 0 to -1 degree of toe.

YOU'LL NEED

- 2-channel radio system.
- Electronic speed control.
- Stick-type battery.
- Charger.
- Paint.
- CA glue for the tires.

FACTORY OPTIONS

- One-way front gear set—part no. GXSo3.
- Sponge bumper—GXSo4.
- Wheel stopper—GSX18.
- Universal dogbones—A516/A517.
- Adjustable rod 3x20mm/3x25mm—GXSo23/GXSo24.
- Graphite upper deck—GXSo26.
- Graphite chassis—GXSo27.

TEST GEAR

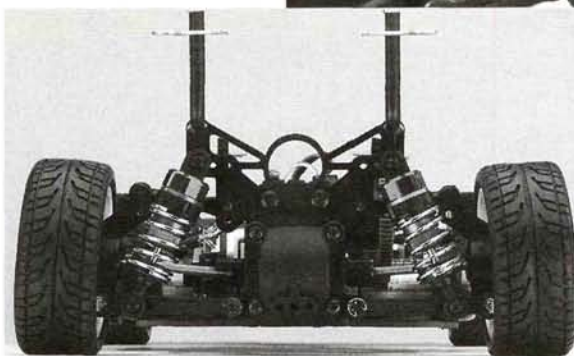
Airtronics* M8 radio • Airtronics 93737 servo
• GM Racing* Sport ESC • GM VIS 1700mAh battery

PERFORMANCE

Not knowing how the GX1 would handle, I decided to test it in a parking lot before hitting the track. I chose a large, recently paved lot, but some sand had blown onto it. I figured it would be a great testing ground for all types of lot conditions.

I powered up the car, put it on the ground and took off. I'm not sure what CEN has done to the label-less motor, but in stock form, this car is quick! The efficient, single-belt design may be a big factor in the equation. Most racers know that speed is the third most important factor in a car's performance; the most important factors are cornering stability and consistency. This car handled extremely well, considering the flexing in the chassis and arms, and plenty of steering makes it a blast to drive. Any first-time racer will be really pleased with its performance.

Then it was time to see how the GX1 would fare in competition. I took it to a local charity race at a radio station parking lot. A bunch of racers showed up to support the cause, and that meant I had some heavy competition. The lot was sealed asphalt with grape soda sprayed onto it for traction. I took a few practice laps with the stock tires and spun out in every corner; slick tires gave the same result. The only tires that dialed in the car were foams. Luckily, I had two pairs of



There are several adjustment holes for relocating the shocks and upper tie-rod linkages. The aggressive camber setting shown here was set in the factory; I recommend that you change it to 0 or -1 degree.

Pro-Line* white compound foam tires that I bolted up. While in mechanic mode, I drained the stock shock oil and filled the shocks with Losi* Certified 40WT oil and slipped Tamiya* blue springs onto all four dampers.

I also slapped in a mod motor (it was a mod class, after all). With all of my changes, the GX1 worked extremely well. I was able to drive into the corner at a good rate of speed, let off and ease back into the throttle without the car looping. It did slip a little leaving some corners, but easing into the throttle gathered it up. The real high-performance racecars were able to dive into the corners a little harder and had more exit speed, but for an entry-level car, the GX1 was pretty impressive and kept a creditable pace, and I finished third in the Main.

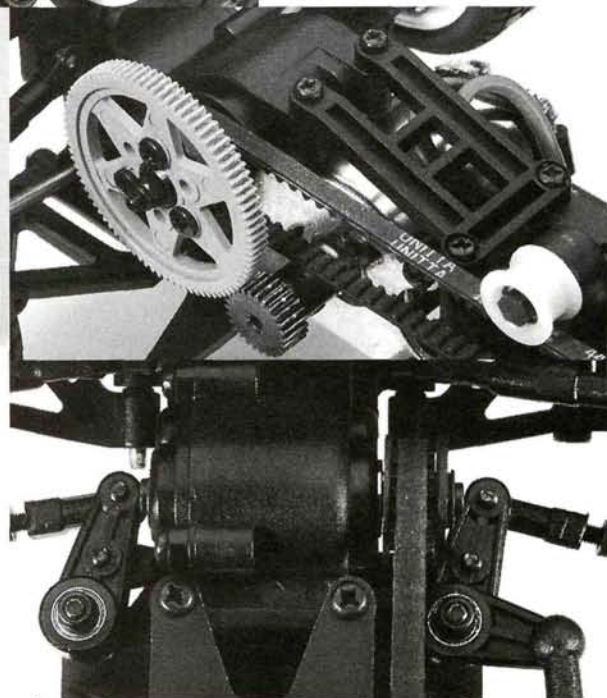
FINAL THOUGHTS

When assistant editor Greg Vogel handed me this car, I asked, "CE ... who?" But when I opened the box and scrutinized its contents, I was very impressed. I did a



Left: aluminum dampers are found on all four corners. The soft plastic suspension components will withstand a lot of abuse.

Below: the kit motor is bolted to an aluminum motor plate. The car requires long-shank pinion gears to properly mate with the spur. The ball-bearing belt tensioner is supplied.



CEN includes ball-bearing steering; pretty impressive. A single belt drives front and rear 3-gear trannies.

double take at the bearings in the steering, and when I saw the list of hop-ups and prices, I was again surprised. By combining low price with high-quality components, CEN has provided entry-level racers with a great starting platform.

If you are looking for a car with a bunch of features and a huge potential for upgrading, then you should seriously consider the GX1. Its out-of-the-box performance is above average, and its hop-up potential allows it to grow in performance as the driver does. My only gripe is with the flexibility of the chassis and suspension, but given that it's aimed at entry- to mid-level racers, a little flexing is forgivable.

*Addresses are listed alphabetically in the Index of Manufacturers on page 209.

- Reliable performance.
 - Bearings in the steering and tension pulley; who would have figured? It's about time somebody included "full" bearings.
 - Body is simply fantastic.
- Likes**
- Chassis and suspension flexing was a bit excessive for my taste (but easily cured with some aftermarket beefcake).
 - Sticky shocks were a minor annoyance.
- Dislikes**

THE COMPETITION

	CEN GX1 (TEAM)	FSR BULLET SPORT	HPI RS4 SPORT	Schumacher SST 2000	OFNA Z10	Traxxas 4 TEC
Wheelbase	10.28 in. (257mm)	10.36 in. (259mm)	10.28 in. (257mm)	10.16 in. (254mm)	10.24 in. (256mm)	10.24 in. (256mm)
Width (F/R)	7.44 in. (186mm)	7.32/7.6 in. (183/190mm)	7.8/7.9 in. (195/197mm)	7.28/7.4 in. (182/185mm)	7.48 in. (187mm)	7.28 in. (182mm)
Diff type		Ball	Bevel gear	Ball	Ball	Ball
Chassis	Fiberglass	Fiberglass	Graphite	Fiberglass	Fiberglass	Composite
List price	\$219.99	\$399.99	\$219	\$369	\$199.95	\$200
Available at*	\$199.99	\$199	\$150	\$225	\$180	\$110
Reviewed in	8/99	1/99	1/99	1/99	1/99	1/99

*Prices vary with location

Rebuildable STOCK MOTOR

We tear 'em down and dyno 'em up

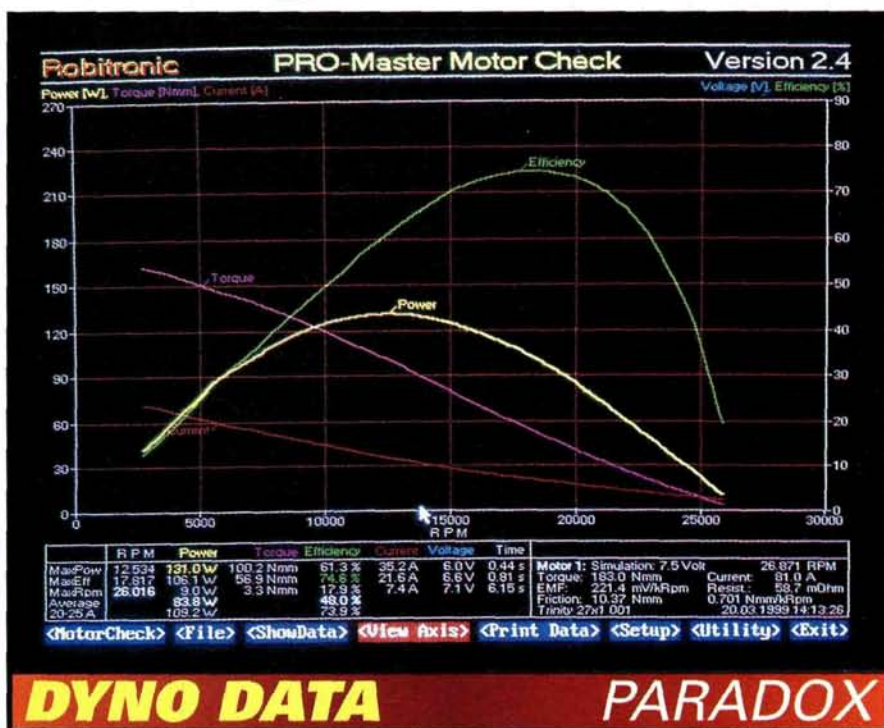
by Steve Pond

THEY'RE HERE. Rebuildable stock-class motors are now a reality in sanctioned racing. Both major sanctioning organizations in the U.S. have given their blessing to this new motor concept, and all of the major motor manufacturers have either released a motor to conform to the new rules, or have at least announced their intent to do so. You will read this at about the same time the new rules go into effect, so we felt it would be appropriate to take a closer look at the motors that are currently available.

Instead of testing every private-label variation, we decided instead to test only representative samples from the primary manufacturers. All the rebuildable stock motors currently available are based on one of three original-equipment manufacturers' designs. Sure, other motor companies put their own "spin" on the motor, but the fact is that the motors come pre-wound from the factory. Those not responsible for the original design are limited to simply tuning the motor to their liking. The three motors tested here represent all rebuildable stock motors currently available behind different labels.

I obtained a few samples of each motor to increase the pool of information from which I drew my conclusions. Each design has been thoroughly tested on a Robitronic Pro Master dyno with a wide variety of brush and spring combinations. The test results shown here represent what I believe to be the best all around combination of brushes and springs for a given motor.

Trinity Paradox



FEATURES

The Paradox is the latest in a long list of innovations introduced to the "stock" market by Trinity*; the most recent was the rebuildable stock motor. Trinity launched production of the Paradox in mid-1998 and is the catalyst that ultimately created a place for a rebuildable stock motor in major sanctioned races in the U.S. and elsewhere beginning in July 1999. The Paradox design dates back to Trinity's Midnight 2 flat-sided motor that was originally supposed to be a rebuildable model, but time and tamper-proofing technology constraints, according to Trinity, dictated that it would be wise to wait.

The Paradox is the culmination of Trinity's innovations in motor technology. It features a short-stack, double-rotor armature with wire retainers at the end of each pole. The crown of each pole is machined to modify the magnetic flux path to "trick" the motor into running as though it has more than 24 degrees of advanced timing. Laydown brush hoods with vibration dampers, endbell heat sinks, low-friction bushings and the largest vent area of any stock motor are all part of the Paradox package.

The Paradox comes in two versions: standard and Pro. The Pro has a diamond-trued commutator, high-quality serrated brushes, a hand-shimmed armature to assure proper alignment within the magnetic field, and a dyno sheet that indicates the level of motor performance an experienced racer may expect.

SHOWDOWN

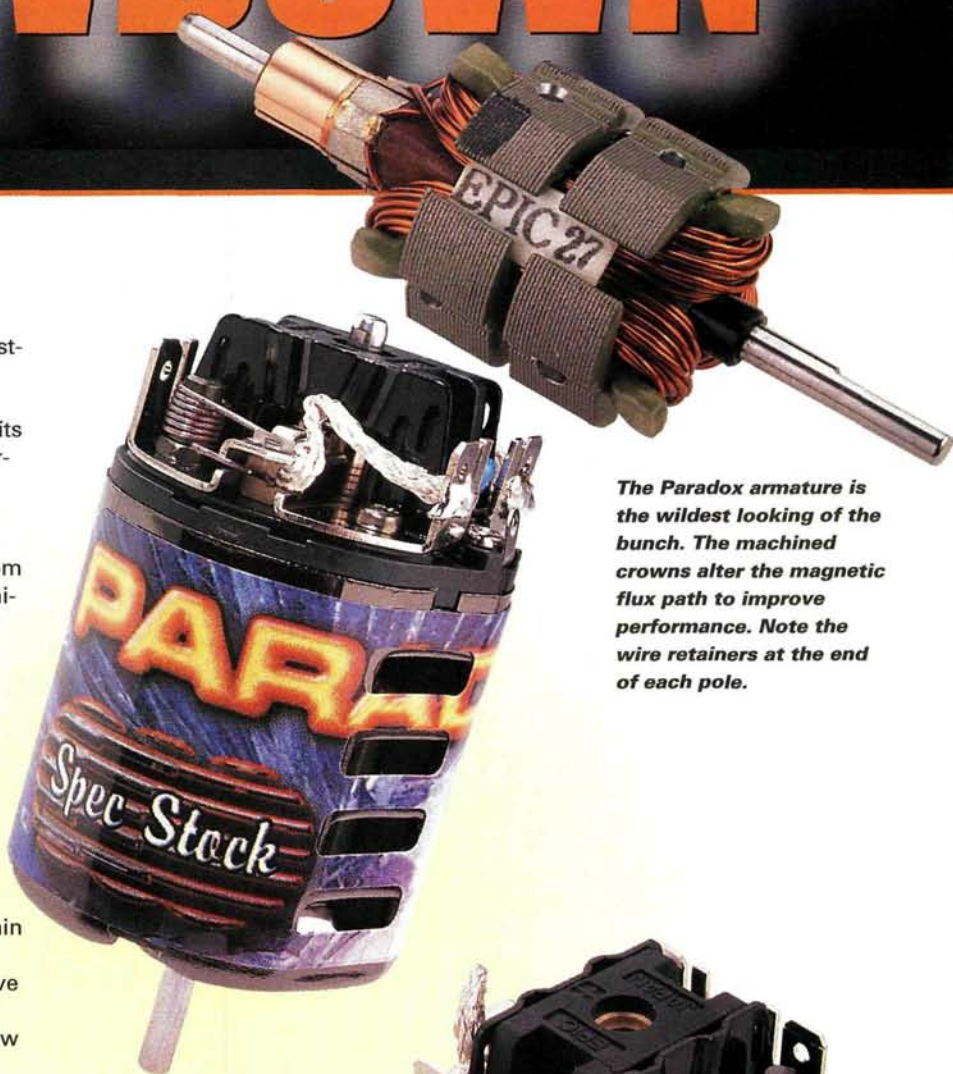
PROS AND CONS

Of all the motors we tested, the Paradox has the best-in-class target-range power output and the highest level of efficiency. The Paradox appears to have a greater mass-market appeal, and the sweet spot of its power band falls into a range most suitable for average tracks. It has a good balance of horsepower for speed and torque for getting out of the turns a little quicker. If you really want to get picky, the high efficiency of the Paradox results in lower amp draw from the battery. This allows the battery to maintain nominally higher voltage throughout the run. The higher voltage is very minimal, but stock racing can be a game of inches. Its flat-sided can also makes the Paradox the most tamper-proof motor available. There is virtually no way to tamper with this motor without the tampering being easily detected by the trained eyes of a tech inspector.

The con side of the Paradox is its brush spring arrangement, which requires the racer to purchase specific springs for the motor. There may be a perceived benefit to having both brush springs on the same side of the endbell, but it goes against the grain of the rest of the R/C motor industry, which has opposing springs. Some racers (where allowed) have switched the spring post to the opposite side of the brush hood on the positive side of the motor to allow use of standard springs.

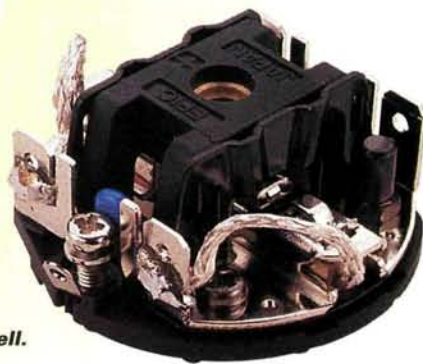


The Paradox is the only motor with a flat-sided can, which makes it the most tamper-proof rebuildable motor available. Unfortunately, the timing ring doesn't allow the removal of the endbell without completely removing the endbell screws.



The Paradox armature is the wildest looking of the bunch. The machined crowns alter the magnetic flux path to improve performance. Note the wire retainers at the end of each pole.

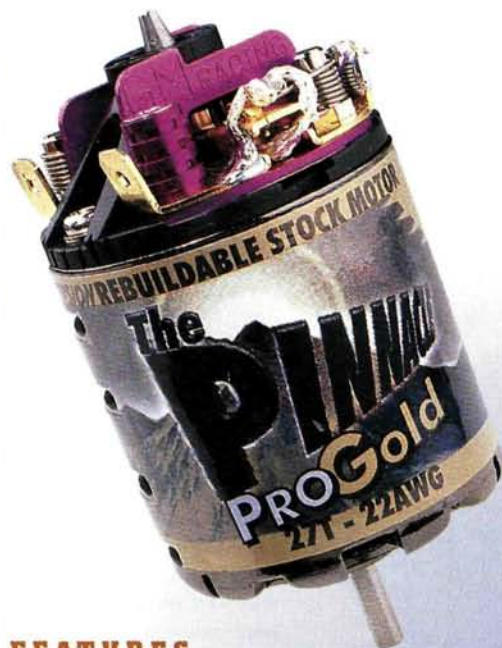
Trinity has placed both spring posts on the same side of the endbell instead of opposing them. This requires you to buy specific springs to fit the endbell.



PERFORMANCE

The Paradox motors we tested generated an average of 125.7 watts of power out of the box. The torque ratings at maximum power average 99.7 Newton millimeters (Nmm). Dyno testing confirmed that the best all-around brush for the Paradox is the Trinity no. 4070 silver serrated "L" slot brush. The silver brushes always seem to produce more power, and the slotted version increases average power output of the Paradox to 131.3 watts, with torque ratings peaking just over the 100Nmm mark. The standard polarized brushes appear to provide a good spring combination, but green springs gave the best results.

GM Racing Pinnacle Gold



FEATURES

The Pinnacle Gold is the latest design in the stock motor market from the GM Racing* camp. GM has supplied stock motors to all ROAR Stock Nationals for the last few years, and this makes the motors—and their performance—of considerable interest to racers who compete at those events.

GM's stock motors, then and now, are built by Sagami according to GM's specifications.

The rebuildable Pinnacle Gold features a new can that has improved cooling via 10 extra cooling holes. It includes a double-rotor armature that appears to be the



The Pinnacle features a new can design with 10 extra cooling holes. Note the large, aluminum timing ring. The armature can be removed with the timing ring attached or left behind in the can.

least complex of the group. There are no holes or flat spots on or through the crown for the purpose of modifying the magnetic flux path. The endbell, much like on the other motors, features laydown brush hoods that have vibration dampers. This is the only motor, however, with heat sinks for the brush shunts in addition to the brush-hood heat sinks. They may not offer much additional cooling, but everything helps.

GM offers a standard and a Pro version of the Pinnacle Gold; GM's Pro gets the same treatment as the Paradox Pro.

PROS AND CONS

On the plus side for the Pinnacle Gold is stellar bottom- to mid-range punch. It has no match in the torque department, which makes it real snappy out of the corners. It is most suitable for small to medium tracks, or those with tight turns that require quick acceleration. It also has respectable efficiency, making it suitable for extended 5- to 8-minute racing. It falls short of the Paradox's rev range by about 400 to 500rpm on average, and it's a few watts shy in the 20 to 25A target range, but an extra tooth on the pinion gear should keep it in the hunt. Just keep it off the long, high-speed tracks, and you'll put down just as much power as the rest of the pack.

A significant feature of the new design is the magnets' placement; they are mounted higher in the can. This allows the armature to find the center of the magnetic field without being pulled down against the bottom bushing in the can. It relieves the motor of a little friction when the arm is properly centered, and common sense dictates that this has at least a limited performance benefit.

The minus side of the Pinnacle Gold centers around its rebuildable design. It functions well in every way, but the round can is inherently less tamper-proof. Less than careful scrutiny may result in missing that the tiny tab that locks the endbell in place at 24-degrees timing has been cut from its original location and glued elsewhere to allow more advanced timing. Couple this with the zero-degree mark in the can that doesn't necessarily line up with any notches in the endbell, and it's going to take a much closer look to weed out the illegal motors.

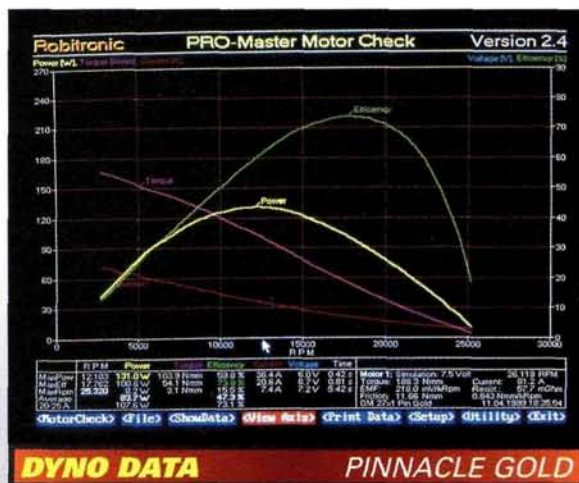
GM includes brush-shunt heat sinks on the Pinnacle Gold—nice touch.



The Pinnacle's armature is the most conservative-looking of the group. Its standard double-rotor design has no visible modifications. This certainly contributes to the excellent torque ratings.

PERFORMANCE

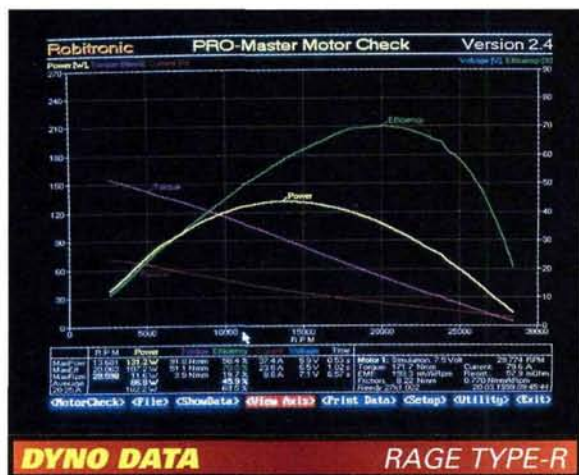
The Pinnacle Gold is the torquemonger of the trio. It consistently produces well over 100Nmm of torque on the Robitronic Pro Master dyno, with a whopping average of 103.4Nmm. The Pinnacle produces an average of 125.1 watts of power out of the box. Add a nice set of Trinity no. 4070 L-slot serrated silver brushes, or Reedy's no. 769 serrated silver cavity brushes with the stock .55mm springs, and it's capable of meeting and sometimes fractionally exceeding the peak-power output of the Paradox. In fact, in previous testing, the Pinnacle posted a best-ever peak power of 133 watts. Part of what gives the Pinnacle Gold such good power numbers is its best-in-class torque ratings combined with its ability to produce respectable revs. It is the lowest revving motor of the three, however, so stay away from full-face brushes and springs that have more tension than the stock ones. If anything, go with less brush and less spring, and let the motor breathe a little.



DYNO DATA

PINNACLE GOLD

Reedy Rage Type-R



FEATURES

The Rage Type-R is a new design for the Reedy*/Yokomo gang that goes beyond the simple fact that it's rebuildable. In addition to all of the rebuildable stock motor regalia, some new features result in performance characteristics that are new territory for Reedy spec mills.

The Type-R design centers around the new 3HL armature. Its double-rotor design has a pair of holes drilled in strategic locations lengthwise through the web and crown of each pole. This modification of the magnetic flux path is similar to the effect the Paradox accomplishes by machining its crowns.

The Rage Type-R is the first rebuildable motor from the Sagami factory, and it features a Yokomo-designed can and endbell. The endbell is home to a pair of laydown brush hoods that sport brush-vibration dampers and brush-hood heat sinks.

The Type-R is available in standard or Type-R Plus trim. The Plus version, much like the other top-of-the-line setups, has a diamond-cut comm, proper armature shimming, a pair of high-quality serrated cavity brushes and a dyno sheet.

PERFORMANCE

The Type-R is the best performing stock motor we've ever seen from Reedy. It generates an average of 124.8 watts out of the box and 130.6 watts with the proper brush and spring combination. This high-revving motor will benefit more from a full-face serrated silver brush in average racing conditions than from the no. 769 cavity brushes that are included with the Plus. A little less spring tension also helps improve efficiency without hurting torque output.

The Type-R is about 4 percentage points below the other motors in efficiency and at least 10 points shy in the torque department. It does, however, have very high revs and runs about 1,400 to 1,800rpm higher than the other motors at peak power output.



The Rage Type-R features a thin steel timing ring that makes removing the armature easy, but the magnets like to grab the steel ring when you're not lookin'!



The 3HL armature of the Rage features holes drilled through the web and the crown of each pole. This undoubtedly contributes to the high rpm range of the Rage.

The Yokomo endbell uses brush-vibration dampers to stop brush chatter as well as brush-hood heat sinks.

PROS AND CONS

The Rage benefits from improved magnet placement (much like the GM Pinnacle), and this allows proper armature shimming. Its high-revving motor starts to show its teeth at rpm ranges far greater than common with the other motors. This makes the Type-R the most suitable motor on long, high-speed tracks where cornering speed can be maintained. At higher speeds, the Type-R actually turns in better numbers than the other two motors. Gearing this motor requires about 10- to 15-percent rollout reduction to get the revs up to a level at which it runs the best. Normally, this limits top speed, but the Rage revs about 10 to 15 percent more, which brings its on-track closer to that of the other motors once it's up to speed.

As the dyno readouts show, the Rage draws more amperage throughout the rpm range. This drops its maximum efficiency down to the 70-percent range and requires a little tweaking to maximize efficiency, if run time is a consideration. Combine this with its need to rev, and the Rage can run a little hot.

Working with brush and spring combinations helps improve the Rage's performance on medium-size tracks, but no matter what you do, this motor is more at home with a little breathing room. Let it rev!

Rebuildable STOCK MOTOR

HOW MUCH BETTER?

Throughout the intensive testing of these latest generation stock motors, a pair of Mabuchi 540 motors that had been removed from the Tamiya Juggernaut I reviewed in the July issue sat on the corner of my desk, and it really hit home that the design of the silver-can motors has remained unchanged for years. In fact, the steel-and-wire time capsules are the basis for our current stock motor rules: 27 turns of 22-gauge wire.

Curiosity got the better of me, and I chucked up one of my fresh Mabuchi 540 motors in the Robitronic Pro Master dyno to see what it could do.

The Mabuchi's best effort was just under 88 watts at a blistering 8,371rpm! (Add sarcasm.) Efficiency is up in the 77.5-percent range, which is also to be expected with zero-degree timing. The surprising part was the incredible amount of torque these docile Mabuchi motors produce. They rate better than two of the three cutting-edge motors I tested! No wonder the Juggernaut pulled the front wheels off the ground!

Sure, the new motors have a ton more timing, which isn't desirable for

producing torque, but you'd still think that a new motor would be able to surpass the dated Mabooch, given the benefit of 15 years of technological advancement. Sheesh!

The serious truth is that the new motors have far surpassed the old designs in every aspect of performance despite the relative similarity in torque production. The fact that the new motors are able to maintain the same relative torque and efficiency ratings while increasing power output to the tune of 50 percent is nothing short of awesome!



AND THE WINNER IS...

All of the motors tested here develop excellent power and elevate performance to the highest levels ever seen in stock-class racing. Each has its own attributes that make it more or less suitable for a particular track condition. If I had to pick the motor that represents the best all-around performer, however, it would be the Paradox. By the narrowest margin, the Paradox makes the best power in a range

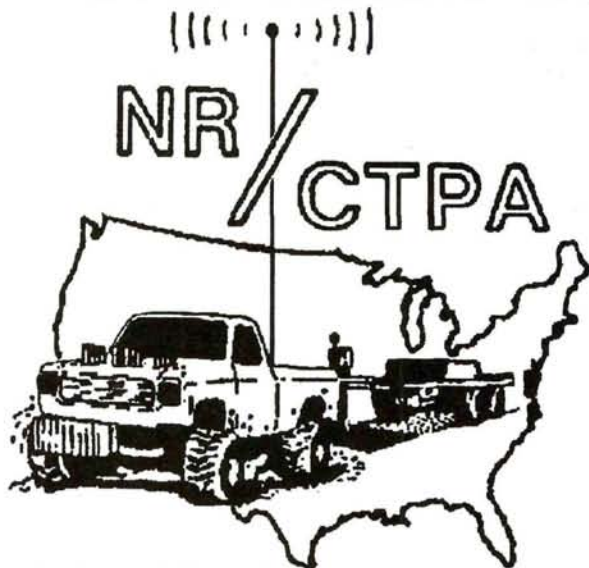
that is most suited to the average track. This alone is not enough to select the Paradox as the best of the new breed, however. What separates the Paradox from the pack is its unique design that makes it the most tamper-proof motor by far. Adding the Paradox's flat-sided can to the equation nets security gains that simply can't be equaled with a round can.

Keep in mind that comparing these motors and offering the superior one in a

given area of performance is primarily framed for the racer. Differences that are obvious and profound to a racer may not be that clearly defined for those who don't intend to put their car on the track. In highly competitive racing, advantages are measured in inches and tenths of a second, not in yards and miles per hour.

*Addresses are listed alphabetically in the Index of Manufacturers on page 209.

11th ANNUAL NR/CTPA PULLING & MONSTER TRUCK RACING WORLD CHAMPIONSHIPS



FOR INFORMATION CALL
716-627-4321
NR/CTPA
2649 Ferndale Ave.
Wanakah, NY 14075-5601

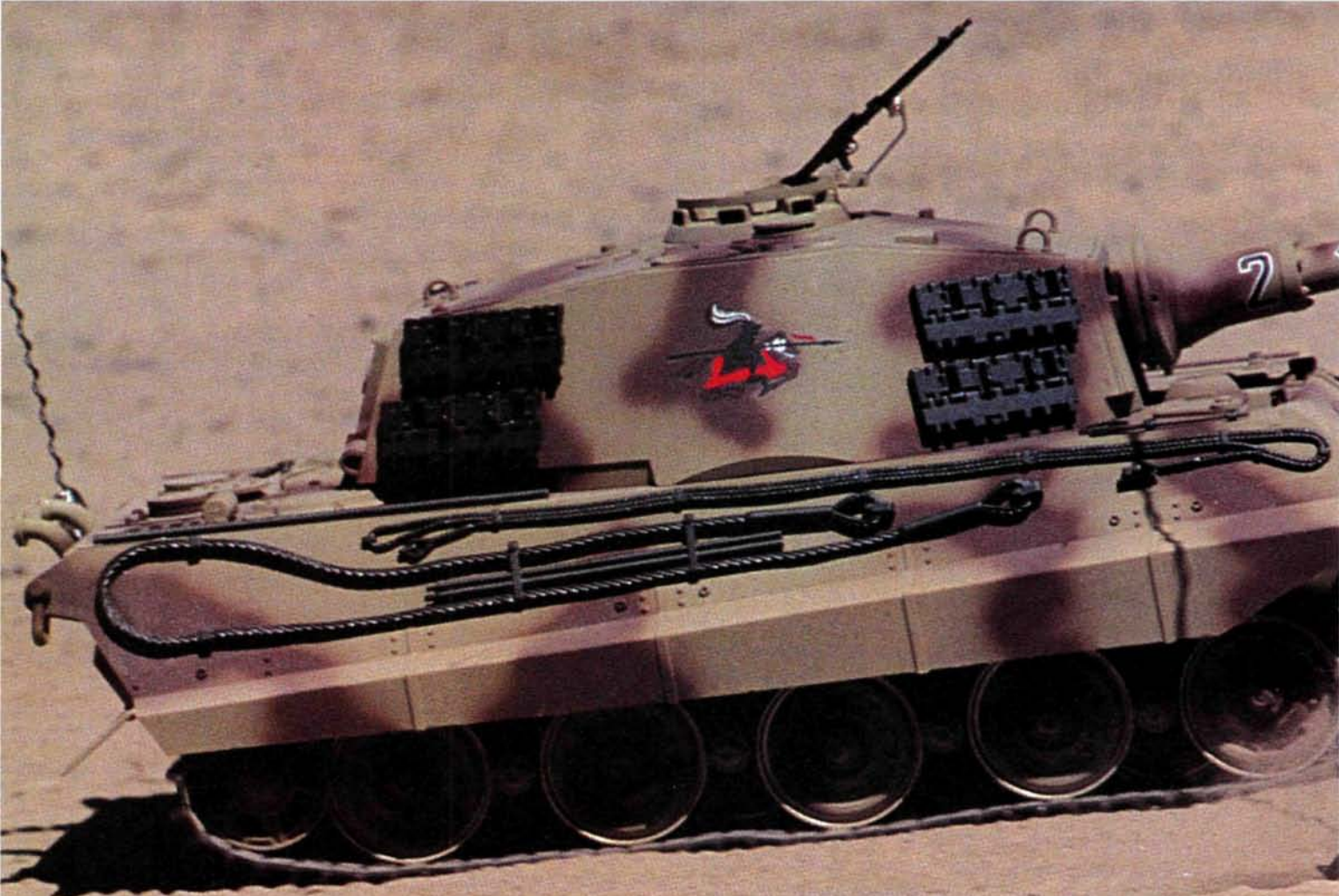
October 9-10, 1999
Holiday Inn Resort Center
Montepelier, Ohio

3 carpet tracks, 1 dirt track for pulling
monster & tuff truck racing
concours judging, manufacturer displays,
door prizes, food on site, in room TV of event
Registration fee: \$20.00 per entry
by September 3, 1999 deadline
After deadline: \$25.00 per entry

NR/CTPA SANCTIONED EVENT

NATIONAL RADIO CONTROL
TRUCK PULLING ASSOCIATION
MEMBERSHIP REQUIRED

website <http://www.webt.com/RCTruckpul>
e-mail RCTruckpul@webt.com
Event polo shirt available
A weekend of fun for the whole family



MILITARY

If you're into touring cars, the options are nearly endless. Want an off-road truck to chase neighborhood canines with? Feel free to choose from a plethora of manufacturers. Thinking about a race buggy? Losi, Associated and Schumacher are there for you. But if you want your R/C

TAMIYA'S FIGHTING FORCE

machine to have a big ol' gun on top of it, there's really only one company looking out for your R/C (as in "remote commando") needs: Tamiya*. The release of the company's newest military masterpiece—the M4 Sherman—was the impetus for this look at all of Tamiya's mini-weapons of mass destruction—including a blast (bad pun) from the past that I'm sure you'll enjoy. Forward, march!

PHOTOS BY WALTER SIDAS



MUSCLE

by Greg Vogel



SCALE • 1/16
LIST PRICE • \$623

DIMENSIONS
Length overall • 14 in.
Width • 7.25 in.

WEIGHT
Gross, RTR • 6.41 lb.

CHASSIS
Material • Aluminum

ELECTRICS
Motor(s) • 380-size stock (2)
Speed control • DMD speed control



M4 SHERMAN

Tamiya's release of a revised M4 Sherman kit is a welcome sight to any scale-model enthusiast. From the movable turret to the metal tracks to the sprung bogie wheels, the M4 is a fabulous model.

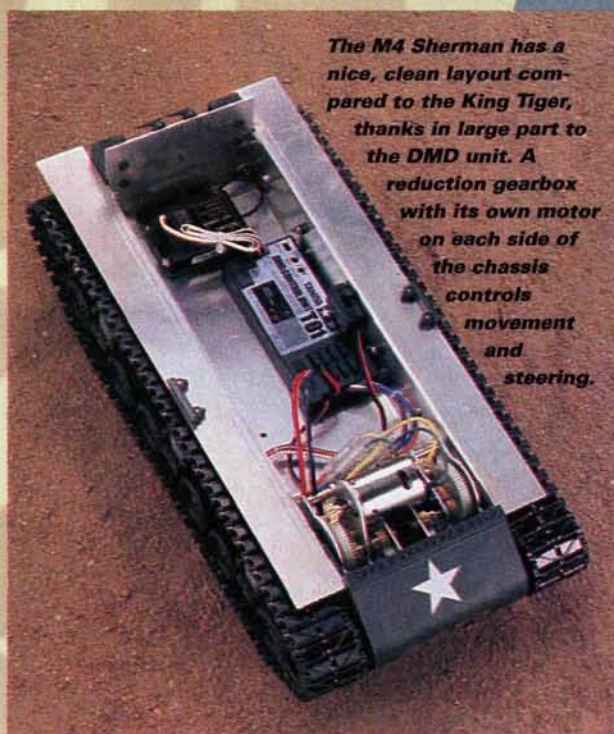
The upper hull is stamped with a copyright of 1974; evidence that Tamiya was just as concerned with scale realism 15 years ago as it is now. There are many small, separately molded detail pieces such as the hatch cover, machine gun and tow-hook that bring the tank to life. The movable gun and rotating turret also help the Sherman look convincing. To complete the tank, I selected the optional Okinawa 1945 paint scheme—a simple spray of olive drab with a web of dark yellow on the turret.

GEAR DRIVE UNIT

Tamiya has taken the liberty of building the most complicated part for you: the gear-drive assembly. The unit is constructed of a series of aluminum plates and brass tubes to support the network of brass and plastic gears. Each gear rides on bronze bushings. Two 380-size motors provide the go power; one motor for each corresponding track. The Digital Motor Differential (DMD) is simply taped into the chassis to control the tank; it is basically a giant ESC designed to operate two motors at varying speeds to steer the tank. The DMD can also make the tank pirouette by rotating the tracks in opposite directions.

ALUMINUM CHASSIS

The foundation for the M4 is an aluminum chassis plate. The plate arrives stamped into shape, drilled, tapped and ready for precise fitting of the other components.



The M4 Sherman has a nice, clean layout compared to the King Tiger, thanks in large part to the DMD unit. A reduction gearbox with its own motor on each side of the chassis controls movement and steering.

METAL TRACKS

Certainly the most time-consuming component to build is the M4's metal tracks. Tamiya supplies several bags filled with parts; you must assemble each and every link of the two tracks yourself. Take extra time to make sure that you're assembling the tracks properly, as the pieces are directional. Once you get the hang of snapping the pieces, you can get a rhythm going to speed up the process.

SUSPENSION

Believe it or not, the Sherman has a spring-loaded suspension system. Inside the cylinders that reside between each pair of track-guide wheels is a spring that absorbs small bumps and irregularities in the running surface. Each pair of wheels is also on a pivot that allows the pair to rock back and forth to help the tracks hug the terrain. Wrapped around each track-guide wheel is a

rubber tire to help the tracks run smoothly and quietly. Notice the incredible amount of detail in the suspension components, right down to the molded nuts on the wheels; this is just one example of the attention to detail that has earned Tamiya its reputation as the master of scale. The far rear wheel has an adjustable mount to adjust track tension as the tracks wear in, and the large die-cast sprockets up front are spun by the gearboxes to drive the tracks.



No wonder Tamiya is known for its impeccable detail; the M4 includes a shovel, an ax and a sledgehammer to give it a true scale appearance.

PERFORMANCE

Of the two tanks tested, the little Sherman was more fun. Its simple, lightweight design allowed peppy speed, con-



From some of the pictures, you could swear we ran full-size tanks at the photo shoot. Here's another look at Tamiya's attention to detail; check out the guard cages around the lights.

sidering that it uses two small, 380-size motors. The DMD control unit is much more versatile than the King Tiger's separate speed control and clutch system for steering and throttle. The Sherman was able to conquer any hill we put in front of it without a hiccup from the motor or drive assembly. Although it doesn't have a motorized turret or strobing gun muzzle like the Tiger, it was still exciting to watch the tank's suspension actuate over every little bump.

Although it's fun to pilot, the Sherman is such a perfect model that it seemed a shame to get it dirty by running it; a squirt or two from an air compressor, however, returned it to show condition.

Talk to the Tanks

The King Tiger tank featured here can be operated with a 2-channel radio, but for full function, a 4-channel stick radio is a must. Naturally, I opted to go all out. Mike Mayberry of Hitec RCD* was kind enough to supply us with radios for the military kits, along with a 4-channel unit for the King Tiger. If you purchase a 4-channel unit for use in a ground vehicle, be sure to get a 75MHz unit. You do not want to use an aircraft radio (72MHz) in a surface application. It could possibly interfere with nearby R/C fliers and is also illegal under FCC regulations.

A 4-channel radio offers the same trims as a 2-channel, such as neutrals and servo reversing, but it allows you to control four functions within your vehicle. In the case of the King Tiger, the left stick activates forward and reverse when you move it forward and backward, while side-to-side movement rotates the turret—right for clockwise, left for counterclockwise. Up-and-down movement on the right-hand stick controls the strobe light (on/off), and left-to-right stick travel controls steering.

Operating one of these radios takes a little getting used to, and you can expect to accidentally "bump" one function when you meant to control another—until you get the hang of it. However, the scale functions of the King Tiger add a lot to the realism and fun of operating it, and I feel that the extra dough and the learning curve that's required to go 4-channel are well worth it.

Hitec's Focus 4.
This 4-channel radio was ideal for the King Tiger.



Painting and detailing tips

I'll bet a lot of you are wondering, "How did he paint the camouflage and details?" Well, I have to admit I didn't do it alone; contributing author Doug Huse lent a hand by painting up the M4 Sherman and the Fast Attack, and Scott Bich of Bich'n Bodies* laid the paint for the Hummer. I, however, took the liberty of slinging the pigment onto the King Tiger. For someone like me who has painted hundreds of clear Lexan bodies from the inside, painting an ABS body on the outside was a new trick. Here are the steps I took to produce a successful paint job.

1 Wash all the plastic parts before you begin and avoid handling any surfaces that will be painted. This can be hard to do with small detail parts, but it must be done, and done carefully. I left all of the small parts on their plastic trees, ran them under warm water and then gently patted them dry with a lint-free cloth. Large parts were washed with warm water and a little dish detergent, then patted dry.

2 If you're building one of the tanks, decide whether you want to paint the aluminum chassis, suspension and wheels. If you want to paint the parts for maximum realism (as I did), you will need to wipe these parts with rubbing alcohol to remove any oil. Then lightly scuff the parts with a Scotch-brite pad or fine sandpaper so they'll have a "tooth" that the paint can adhere to. After prepping these parts, you will need to spray a coat of primer on them.

3 Painting each part individually can take a long time. I like to sift through the manual and see which parts can be glued on before I start painting. Parts like tow-hooks, cages and hatches can be glued on before you paint. Assemble as much of the tank as you can, especially if you plan to do a camouflage job. Real camo is sprayed right over assembled parts; if you apply a camo scheme and attach the parts later, they will "pop out" against the camo. Then you'll have the difficult task of matching the camo look on the separate detail parts.

4 With the hull of the tank or Hummer body assembled, it's time to spray the main coat. All of the vehicles you see here were painted with Tamiya paints, as suggested by the instruction manual. To cover the King Tiger, I used a heavy-tip Model Master Airbrush from Testors* and Tamiya Dark Yellow paint. The heavy tip is used to cover large areas. You'll want to add a few drops of thinner to the paint, but be sparing; I found Tamiya's paint to be pretty thin and already close to the proper consistency for spraying. Spray each part in one direction, then go back and spray another coat on the parts perpendicular to the first coat. This should give you a nice, even coat.

Continued on page 206

KING TIGER

The last place any soldier wanted to be during WW II in 1944 was on the frontline when the German Heavy Tank VI "King Tiger" rolled into battle. This badass tank sported an 88mm cannon that was capable of piercing 222mm-thick armor plate and had two additional 7.92mm machine guns for additional firepower support. The tank was powered by a water-cooled V12 engine and was considered one of the best tanks in the War. To honor the King Tiger's lofty status among honored armor, Tamiya has replicated the metal monster into a precision, 1/16-scale radio control model. But instead of a powerful V12, this tank has a 540 electric motor, and instead of a blazing 88mm cannon, it's armed with a strobe light.

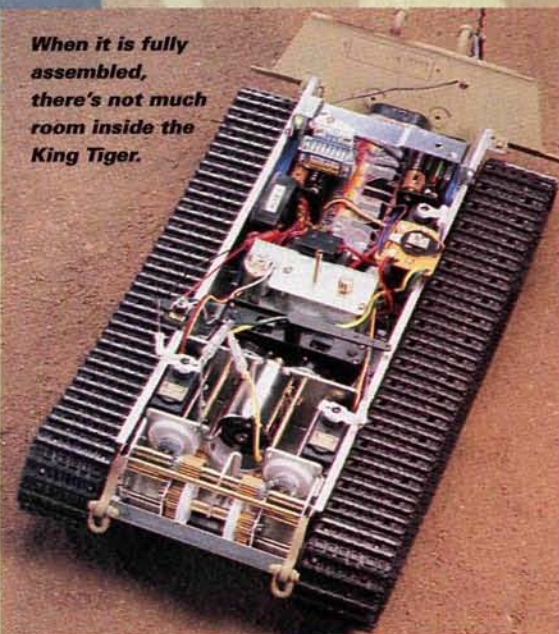
ALUMINUM CHASSIS AND SUSPENSION

The foundation of this massive R/C tank is a stamped aluminum chassis. Long steel rails bolted to the chassis, along with cast-aluminum suspension housings, support steel torsion plates and the cast suspension arms. It's definitely a piece of heavy equipment; Tamiya really built this tank like a ... well, like a tank!

FACTORY-ASSEMBLED GEARBOX

When you open the King Tiger's box, the prebuilt gearbox immediately catches your eye. You really have to thank Tamiya for assembling it; there are many plastic and bronze gears that bolt onto guide shafts between the aluminum alignment plates, and assembling it yourself would probably be tedious, at best. A single 540 motor drives two large spur gears to motivate the tank. Each spur is mated to a clutch, and the clutches are controlled via levers connected to the single steering servo. The clutches allow the speed of the left and right tracks to be varied to make the vehicle turn. Although effective, the system does not allow the tracks to counterrotate for pirouette turns like the Sherman, and the system is very complicated and heavy.

When it is fully assembled, there's not much room inside the King Tiger.



MOLDED HULL

The tank's hull is molded in brown ABS plastic, and the model sports a ton of detail. Several parts trees filled with tow-hooks, vent covers, tools and cables are supplied to enhance the tank's appearance.

The huge gun on the turret houses a strobe light that simulates muzzle flash, and the control module for the light nestles in the turret. If a 4-channel radio is used, the strobe can be actuated via R/C, or it can be manually activated by flipping a switch. The flash rate of the strobe can be adjusted by a knob on the unit.



SCALE • 1/16
LIST PRICE • \$572

DIMENSIONS

Length of tank
w/out gun barrel • 18 in.
Width • 9.5 in.

WEIGHT

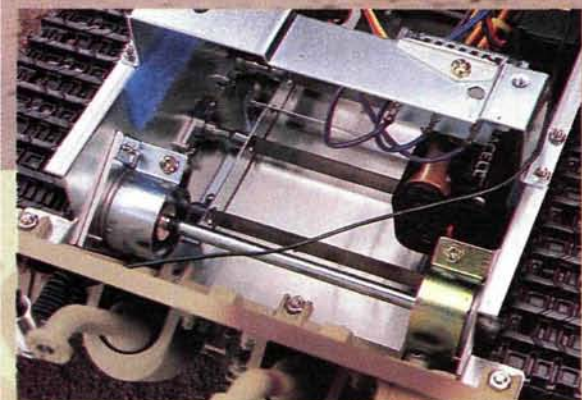
Gross, RTR • 10.3 lb.

CHASSIS

Material • Aluminum

ELECTRICS

Motor • 540-size stock
Speed control • 3-step
mechanical
w/reverse



The long, flat plates at the bottom of the chassis are the torsion-suspension bars. The two round clamps on both sides of the chassis are used to adjust track tension.



To achieve better detail, bolt cutters, vents and exhaust tips are all molded on separate parts trees.

All you need to do is slip the tracks around the guide wheels and insert one pin to secure the loop. The tracks are kept in line by 10 guide wheels on each side and a cast-aluminum sprocket wheel up front. The sprocket transfers the power from the gearboxes to the tracks.

PERFORMANCE

The King Tiger doesn't go very fast; after all, the single 540 motor has a lot of gears to turn and weight to push—10.3 pounds, to be exact. The Tiger doesn't turn on dirt as easily as it does on pavement, but even on blacktop, the turning radius is pretty wide. Hills are also a threat to the model, as its considerable heft tends to overpower the drive clutches when the going gets steep.

Even though we discovered some limits to the Tiger, it was tons of fun to play with. Moving the turret by radio function is just too cool, and the strobe light at dusk is a real

eye-catcher. All in all, the Tamiya King Tiger is an outstanding model and a fun radio control vehicle. It takes a long time to build and detail, but when it's done, it is well worth the effort and money you've put into it.



The cables on the side of the tank look real but are actually plastic. The tracks are plastic too, but they ride on metal wheels.

TRACKS

Tamiya has also taken the liberty of assembling the plastic tracks for the King Tiger.

SCALE • 1/12

LIST PRICE • \$220

DIMENSIONS

Length overall • 15.25 in.

Width • 8 in.

WEIGHT

Gross, RTR • 4.36 lb.

CHASSIS

Material • Plastic tub

ELECTRICS

Motor • 540-size stock

ESC/MSR • 3 step
mechanical
w/reverse

Unlike other colorful TA01 chassis, the Hummer's is molded entirely in black plastic.

CHASSIS

The Hummer's foundation is a TA01 sedan tub chassis, which first saw duty on the Manta Ray 4WD off-road buggy. Unlike the sedan and other Manta-based off-road machines, all of the Hummer's chassis parts are molded in black plastic. The tub accepts 6-cell stick battery packs and provides ample space for the electronic gear.

DRIVE TRAIN

An off-road military vehicle such as the Hummer wouldn't be complete without four-wheel drive. The motor drives a series of gears to the rear ball differential which in turn distributes the power to the wheels via dogbones. The front gearbox is equipped with a ball diff, and a wire propeller shaft links it to the rear transmission. The entire drive train runs on a mix of bronze and plastic bushings. The Hummer is geared for torque, but it's easy to gear up for speed with Tamiya's trademark motor-mounting plate. The plate is labeled according to pinion size; just bolt the motor into the mounting holes labeled with the pinion size you are installing, and the plate will align the motor for perfect gear mesh.

SUSPENSION

Four-wheel independent suspension soaks up the rough terrain and mild jumps. The 2-piece suspension arms are unique to the Hummer and are molded in a soft plastic for durability. Stout hub carriers and steering knuckles, well tested in on- and off-road use, keep the Hummer pointed in the right direction, and molded camber links eliminate setup guesswork. All four arms are damped by plastic, oil-filled, coil-over shocks, and preload clips are supplied to adjust ride height.

WHEELS AND TIRES

On each corner, you'll find sedan-size scale rims resembling those of the real Hummer. Tamiya has detailed these rims to the max by molding in multiple lug nuts. Tall-sidewall, scale treaded tires are a perfect match for the wheels and lend a no-nonsense look to the big truck.

PERFORMANCE

Possession of the Hummer's radio was the cause of some arguing among the

editors during the testing and photography session; none of us could get enough wheel time. The Hummer is a blast, even in stock trim. We all enjoyed pitching the truck sideways through turns and spraying sand across staff photographer Walter's camera lens (he wasn't as amused as we were). Jumping was also a lot of fun; we got some air under the wheels and watched it land on all fours every time. However, hard landings do tend to beat up the drive train when you stay on the throttle. The best way to get air with the Hummer is to pull full throttle off the jumps and keep on the throttle through the air to help keep the nose up. When it's about to touch down, let off the throttle; this takes the load off the drive train so the gears aren't suddenly stressed by a hard landing.

M1025 HUMMER

One of the most recognizable military vehicles today is the Hummer. Much more than a replacement for the beloved Jeep, the Hummer is a multi-faceted vehicle that's capable of acting as a transport, gun platform and rescue wagon. The brutish machine has also made inroads into the sport-utility market as the ultimate personal off-road machine and choice of macho celebs such as Arnold Schwarzenegger. Tamiya has replicated the military Hummer in ABS plastic with impeccable detail, from the turret hatch to its signature square nose. Let's check out the rest of the details.



FAST ATTACK

Here's a hot little recon/assault machine from the hobby's early-'80s boom years. This is the type of machine only Tamiya would build (God bless 'em), and it's a real crowd-pleaser. Unfortunately, the Fast Attack Vehicle is long out of production, but I thought you'd enjoy seeing it. Special thanks to Radio Active Raceways* for the kit and to Doug Huse for the box-art paint job, and a sincere "the-photographer-made-me-do-it" to Steve Pond, who owns the car and made me promise I wouldn't run it!

BLOW 'EM AWAY

There has to be a machine gun; the Fast Attack just wouldn't be complete without one. When Tamiya goes for scale, they do it right, and the super-detailed bad-guy blaster is proof.



CAGED FOR SAFEKEEPING

Can you say tight? There is very little room left on the chassis after the electronics have been installed, and access to them is a big problem when the car is assembled. The hood, as well as the driver with platform, is screwed to the frame with small, self-tapping screws. You gotta dig the full roll cage and trailing suspension arms. Sigh ... those were the days.

MILITARY MILL

The Fast Attack packed in a huge, stock 540-size motor ... well, it was big in those days, when many other cars used 380 motors. Tamiya offered two pinions: a 15 for "low speed" and an 18 for "high speed." Of course, I installed the high-speed gear when we ran the beast. When operating a fragile, irreplaceable car that doesn't belong to you, always go for speed. Power is transferred through the gearbox and to the wheels by classic Tamiya hex-end universals that crackled and popped just as loudly as they did back in the day. Memories.



NUCLEAR POWER

Ahh, the enclosed 6-cell Tamiya pack. Remember how hot these batteries got during a charge or after a heat of



racing? I don't know how they lasted so long. When they did overheat, it was always fun to watch as the plastic casing bubbled like a Jiffy Pop dome above the cell that was going nuclear.

PEACE OUT

Building these scale masterpieces requires more time and patience than the typical R/C car; it took four straight days of work to complete the King Tiger alone. But the results are worth the time and effort, and the completed machines are not only fun to drive but make excellent static models when not in use. In action, the kits are just too realistic—the only giveaway that these vehicles are radio controlled is the long wires that wrap around the antenna masts. If you want to get onto the battlefield but don't want to enlist, Tamiya's military replicas are the best way to join up.

*Addresses are listed alphabetically in the Index of Manufacturers on page 209.



GM Commander Charger

by Peter Vieira

What's in the black box?



There are more high-end computer-controlled chargers on the market than ever before, which only means a greater range of choices for those discriminating hobbyists looking for the ultimate battery blaster. GM Racing's* entry into the top-shelf charger/discharger arena is the GMVIS (for GM Voltage Increasing System) Commander, an unassuming-looking black box that belies the unit's many features. Rest assured, they're in there, as I quickly discovered. Check it out for yourself.

FEATURES

The first thing I noticed about the Commander is its tool-like construction; it's a heavy steel chunk o' technology that feels like it's made to last. A six-button, membrane-type keypad and double-line dot-matrix display allow you to operate the charger and see what it's up to. Cooling fans are built into the sides of the case, where there's no chance of interference from pit towels or misplaced hardware. One fan sucks cool air in, the other exhausts it; pretty cool (pun intended). The power input leads are permanently attached to the unit and equipped with banana plugs, while a pair of RCA-type jacks are provided for the included output leads that feature insulated alligator clips and GM's plug-type connectors. There's also a jack for the optional temperature sensor that unfortunately was not available at press time.

OPERATION

Operating the GM Commander takes a little getting used to, primarily because of a safety feature built into the keypad. To prevent accidental setup changes due to someone or something bumping the keypad, the Commander will only recognize commands if the key in question is depressed for more than a full second. Nothing difficult there, but you do need to get used to pressing the buttons very deliberately rather than quickly keying in functions.

CHARGING

Let's see; do you think the MODE key would be used for mode selection? Right you are. After entering the mode selection screen, you can scroll through the different options by using the up/down arrow keys. Three modes can be selected: linear peak charge (PEAKCHG), temperature cutoff (TEMPCHG), or GMVIS (GMVISCHG). The last mode is GM's proprietary charge system. According to the manual, the system increases voltage without harming the batteries or decreasing

run time, and suggests the GMVIS mode is particularly well suited to stock racing and 4-minute heats. GM does not explain how the GMVIS system achieves this, but the manual suggests you max out the amperage to 8 to 9.9 amps for best results. More on this later.

When you've selected the mode you wish to use, use the toggle key (right arrow) to adjust the

MANUFACTURER SPECIFICATIONS

RETAIL	\$495
Case size	7.3x6.5x2.5 in. (185x166x64mm)
Weight	53.2 oz. (1,508g)
Input voltage	11 to 15 volts
Charging modes	GMVIS, linear peak, temperature peak
Charging capability	1 to 30 cells
Discharging capability	1 to 30 cells
Charge rate*	0.3 to 9.9 amps
Discharge rate*	0.3 to 20 amps

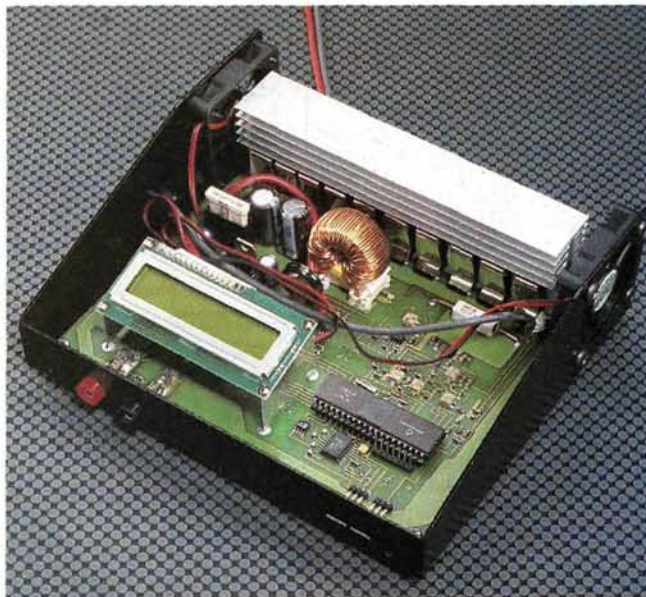
*Maximum amp setting cannot be used when charging or discharging more than 7 cells.

charge amperage, maximum temperature (if you have the optional temp sensor), capacity (mAh) and voltage. The capacity and voltage settings are not programmed to reflect the known capacity and voltage of the pack you are charging; instead, they are programmed as cutoff points. For example, if you are charging a 7.2V, 2000mAh pack and programmed those values into the Commander, you would not get a full charge, since the pack actually accepts more than 2000mAh of juice and will peak at over 9 volts. It would be more appropriate to punch in settings of 2400mAh and 10 volts (or just stick with the default values of 2800mAh and 14 volts). Certainly, the Commander's peak-detection circuitry is reliable by itself and will stop charging before it hits the cutoff settings, but the additional, programmable safeguards are a welcome touch. The Commander will store the settings after power-down.

When you're ready to begin charging, hit the start/stop key. The Commander will display the charge amperage, capacity in milliamps and voltage. When charging is complete, the display reads "READY." Unfortunately, the display does not show charge time or save the peak voltage; once the charge cycle is complete, only the resting voltage is shown.

DISCHARGING

The Commander features a highly capable discharger that can dump your packs at 0.3 to 20 amps, allowing it to safely discharge transmitter batteries and even glow starters. This function is programmable for amperage and cutoff voltage, but it does not utilize a temperature sensor except in cycle mode. This is where it gets interesting. The Commander can cycle a pack up to 9 times and is factory-programmed to rest the pack for 3 minutes after each charge, and 20 minutes after each discharge. When the temperature sensor is used, the Commander can be programmed to rest the pack until it reaches a user-input temperature without regard for time; if the pack gets really hot, the Commander will wait for as long as necessary to reach the safe temperature before charging again. After cycling is complete, the Commander displays a results screen that indicates the average discharge voltage of the last discharge cycle, the input capacity of the last charge cycle, battery temperature (if temperature sensor is connected), output capacity of last discharge cycle, and output capacity with voltage cutoff of 1.0



It's easy to see how the Commander keeps its cool. The massive finned heat sink is placed between two fans; one draws air into the case, while the other exhausts. Note the clean interior layout, with plenty of room for upgrades down the road. This is a quality piece of gear.

volt per cell. There is also an "SD?" prompt, which stands for "send data." This feature will be used on future versions of the Commander that will be able to interface with your home computer via a serial port. For now, you'll have to go analog and write down the data, since the Commander cannot store it. Once you go to another screen, it's gone!

TIMER FUNCTION

This is kind of cool. Let's say you're at a race and want to blast for lunch before the Mains, but you don't want to charge your battery before you leave or rush back to peak your pack. The Commander can be set to delay charging for up to 99 minutes, which is plenty of time for a lunch mission, even if you have to go back because they gave you cheeseburgers when you specifically asked for hamburgers.

TAKING COMMAND

With the exception of GMVIS mode, I utilized all of the Commander's functions, and all work as promised (I'm doing some long-term testing for an article on the benefits of non-linear charge modes, such as GMVIS and reverse-pulse, so stay tuned). I did safely charge 6-cell 2000mAh packs at 9.5 volts in GMVIS mode with charge times in the 20-minute range and observed no apparent ill effects.

The Commander is sometimes frustrating to operate until you've learned its quirks. I've got it dialed now, and I love it. If you get a Commander, keep the following in mind:

- If you get totally lost, you can reset the unit to the factory settings by disconnecting it from the power supply then restarting while holding the MODE key until the initial screen comes on. Give the Commander a minute to "forget" before you power back up, though, or it will just return to the last screen you were on.
- The fans do not spool up the moment the unit begins charging. Don't worry; they'll jump into action after a minute or so. Once activated, they work great; even after a mega-cycle session, the Commander is stone-cold. You can even use the exhaust fan to cool your packs!
- Charge amperage can be changed in 1A steps while charging by pressing the up/down keys. Changes, however, will not be saved.
- If you are in a program mode and want to switch between the charge, discharge and cycle functions, you must hit start/stop then toggle (right arrow). Press the toggle key to cycle through the functions, then hit MODE when the function you wish to use or program is displayed.

SHOULD YOU GET ONE?

As a reliable charger with super-solid construction, easy operation (with a little learning time) and an excellent cycling function, the GM Racing GMVIS Commander is an excellent unit for racers. Information junkies, however, will yearn for more info from the charger; it would be nice to have charge time and peak voltage displayed. To be fair, watching the mAh value increase functions kind of like a timer; in some ways it's better because you can see how close you're getting to a complete charge, since you know (at least roughly) the capacity of the pack. Those quibbles aside, this is a fine charger/discharger that will only get better as GM incorporates the computer interface and a promised motor break-in function.

**Addresses are listed alphabetically in the Index of Manufacturers on page 209.*

New Permanent On-Road Racing Facility in Southern California

BW Raceway in Riverside, CA, recently opened its doors, and this means that Southern California's on-road racers now have a permanent outdoor racing facility at which to compete. The track is currently open for practice from 10 a.m. until 5 p.m., Monday through Saturday, with races every Sunday. Lots of pit tables and full electrical power are provided, and adjacent to the track there is plenty of room for racers who have their own tables, chairs, extension cords, etc., to set up. Raceday registration starts early and pit space is limited, so racers are encouraged to arrive by 8 on raceday mornings.

The large track features a concrete sur-

face with plenty of bite, and the track layout is changed every two weeks to keep racers on their toes. The track is fully lit for night racing, and on racedays, computerized lap counting is provided, as are a snack bar/restaurant and all the usual conveniences. There's no hobby shop yet at BW Raceway, so be sure to stock up on spare parts before raceday. A permanent hobby shop is in the works, though, as are additional pit tables. Check out the action at BW Raceway; I'm sure you'll be just as impressed as I was. Call Brian Wright for directions and more details at (909) 486-9315, or stop by: 5292 24th St., Riverside, CA 92509.

Trinity to Introduce New Gear Standard

Trinity has announced the release of BK Pitch World gears, designed for use in all types of R/C vehicles. The new pitch is finer than 48 pitch for greater gearing flexibility, but larger than 64 pitch for increased durability. According to Trinity, the spur gears will be constructed of self-lubricating plastic and will be machined rather than molded to ensure perfect concentricity and correct tooth profile. Spurs will be offered for dual-slipper Losi vehicles and all cars and trucks that accept "standard" gears. Matching BK Pitch pinions will be offered using the "Hard Ones" construction (case-hardened steel) and 1/16-inch setscrews. BK Pitch gears should be available by the time this issue hits the stands.

Reedy TRUCK RACE OF CHAMPIONS

RACE RESULTS

At Hot Rod Hobbies in Saugus, CA, 190 racers attended the Third Annual Reedy Truck Race of Champions; this made it the biggest Reedy Truck Race to date. Four classes were offered at the event: Factory Mod Truck, Mod Truck, Stock Truck and Gas Truck. Team Associated driver Adam Drake won the Factory Mod Truck class after settling a three-way tie between Billy Easton, Brian Kinwald and himself. Jason Jakubczyk picked up the Mod Truck win, while Jeremy Kortz secured the win in Stock Truck. The Gas Truck class featured a 45-minute A-Main battle between Mark Pavidis and Greg Degani, and in the end, Degani crossed the line first. Check out the Reedy Truck Race of Champions action in an upcoming issue of *R/C Car Action*.

RACER TIP OF THE MONTH

■ Richard Saxton Team Orion/Associated/Thunder Tiger driver

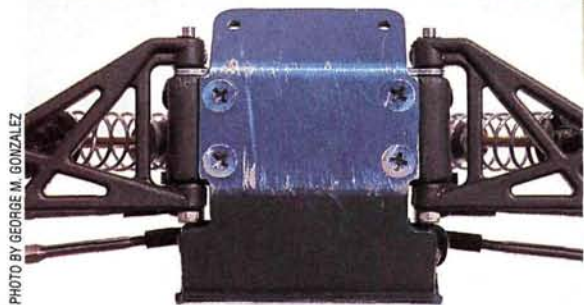


PHOTO BY GEORGE M. GONZALEZ

Anything can happen during a 60-minute gas race, and experience has proven that it's better to fix potential problems before they have a chance to become real problems. To make your RC10GT's front suspension bulletproof, replace the stock hinge pins with Associated 1.02-inch shock shafts. The shock shafts have the same diameter, and this means you won't have to ream out the suspension arms to allow the shock shafts (now hinge pins) to pivot freely.

The shock shafts will, however, be too long, so you'll need to cut them to size with a rotary tool equipped with a cutoff wheel. Use the top E-clip indentation on the shock shafts as a guide and make the cut precisely on that mark. (The shock shafts have two E-clip indentations, so make sure to use the indentation that's farthest from the threaded portion of the shock shaft.) Next install 4-40 locknuts on the threaded portion of the shock shafts, and put the front suspension back together while making sure that the locknuts are installed on the rear of the bulkhead. The last step is to install E-clips to the new hinge pins; then you're done. Even if the E-clips fall out the hinge pins will stay in place because they are now captured by the locknuts.



RACER news

By George M. Gonzalez

INNOVATOR AT WORK

Philippe

Neidhart

The European speedsters at Team Orion have recently begun to come on strong here in the good ol' USA, now that the company has launched its new Team Orion USA facility in Irvine, CA. Along with the addition of respected motor tuners such as Oscar Jansen and Darren Westman, Team Orion has invested in new equipment to assist in tackling the tough U.S. market. Team Orion's Philippe Neidhart is this month's "Innovator at Work"; we're certain you'll enjoy learning a little more about how the company began and its plans for the future.

R/C Car Action: There have been many new developments at Team Orion over the last few years: Team Orion USA was established in Irvine, CA, and the company has added a new line of electric motors to its existing batteries and accessories. We have a lot to talk about, but perhaps we could begin with some background. What made you decide to start Team Orion?

Philippe Neidhart: First, my thanks for this opportunity to communicate directly with *R/C Car Action's* readers. My grandfather and my father were involved in rubber suspension research and development, and in 1968, my parents started a company called Rico Neidhart that distributed R/C products mainly to the model airplane industry. I always loved R/C, especially cars, and when I was 20 years old, I went to work in my parents' company and created an R/C car department in addition to the airplane parts. From there, I attended business school and shortly afterward, established Team Orion; it was my first business.

RCCA: What were the company's first products?

PN: My first product was Team Orion matched Sanyo 1200mAh SC batteries; you see, I had qualified for the 1987 off-road IFMAR Worlds in England, and at that race, I discovered that my batteries were not very good; I did not get 5 minutes of speed, like some of the other drivers. I met Kent Clausen, who was working for Lavco then, and bought one of the first Cell Mate 10 machines; it was the first machine available to test Ni-Cd cells. I started testing cells in October 1987 and came to the conclusion that Ni-Cds must be matched to provide maximum performance.

RCCA: Team Orion batteries and motors have been available in the U.S. for several years through various distributors. Why did you decide to establish a U.S. headquarters?

PN: From 1988 to 1998, Peak Performance was the only U.S. distributor for Team Orion. Company owner Rick Hohwart did a great job for us, and I would like to thank Rick and wish good fortune to everyone at Peak Performance.

When Team Orion decided to produce high-performance electric motors, it was diffi-

cult to continue with Peak without a conflict of interest, since they were already established in the electric-motor market. It was better for the companies to split up and continue on their own paths.

RCCA: I understand that Team Orion has new methods of matching battery packs. How is the process unique compared with other battery-matching sources?

PN: I will try to explain it in a simple way. The



PHOTOS BY GEORGE M. GONZALEZ



first step is cycling the cells; during that process, we separate the cells that are just OK from the high-quality cells, and these are reserved for the R/C market. The normal, "just OK" cells are used in other industries. We have a lot of customers who use Team Orion cells for medical applications, safety devices, etc. They just want cells that have been tested; this assures them that the batteries will work when needed. After the cycling process has been completed, we prepare the cells that are to be made into stick packs and used by hobby racers and enthusiasts. Some of our less expensive, hobby stick packs are matched, and some undergo the V-Max voltage-increasing process.

We use the new race discharge simulation concept, also called RDS. It is a race simulation program with an average amp discharge that can be set to 30, 27, 20 or 17 amps to simulate 4-, 5-, or 8-minute races for both on- and off-road racing. The cells are sorted into four classes, depending on voltage and/or capacity. The unique part of the system is the V-Max Plus process developed by Team Orion with the help of a designer from the European Nuclear Research Center. Our first production run of V-Max cells was early in 1996. We use Lavco Matchpoint battery-matching equipment. The machines are more expensive than other commercial battery-matching systems, but we believe you can't put a price on satisfied customers! I think our combination of high-quality matching equipment, the RDS software and the innovative V-Max Plus process ensures high-quality cells with the performance our customers have come to expect from Team Orion matched batteries.

RCCA: Many racers believe that to be competitive on a national level, they have to be sponsored; it's the only way to get the best cells available. Some racers also believe that the batteries purchased at regular hobby shops are not as stout as the batteries team drivers use. Do you agree, or do you think an average racer can go to a hobby shop and buy the same cells that Team Orion-sponsored drivers use?

PN: Team Orion sells cells that have various levels of performance. The best level—AT2606VM3—is what our team drivers use. Richard Saxton won the '99 NORRCA Truck World Cup with a product you can find in any good hobby shop in the country. We are matching more cells per year than we could possibly use ourselves, and we need to sell them. We cannot keep all the good cells for our team drivers; it's just not feasible. At Team Orion, we have plenty of good cells



Philippe monitors another batch of cells as they are processed by banks of Lavco Matchpoint machines.

because of our extremely large buying volume and our worldwide distribution. If you buy a Team Orion matched battery pack, rest assured: you could win a national championship with it.

RCCA: What technology makes Team Orion motors unique?

PN: Team Orion wanted to bring some new innovations to electric-motor technology. We wanted to establish a new standard and offer a better product at the same price.

Our California motor-production facility is ultra modern; all the machines were developed in-house and manufactured to Team Orion's exacting standards. We also use the latest motor-winding technology. Darren and Oscar have developed a manufacturing line that makes the pattern-wound technology affordable for all our customers. This new line allows us to mass-produce pattern-wound armatures. The investment was huge but again, we are working for the satisfaction of our customers. Team Orion's pattern-winding system provides a balanced electromagnetic field within the armature's three poles; this makes it unnecessary to drill-balance the armature and thus keeps the maximum material for stronger magnetism.

RCCA: Now that ROAR has approved rebuildable stock motors, what's going to happen to non-rebuildable motors? Will they become obsolete? While we're on the subject, do you feel that rebuildable motors are truly tamperproof?

PN: I think that a lot of people in the U.S. like rebuildable stock motors because they offer many benefits. They're easy to tech and, of course, they can be rebuilt. The new 5-degree stock motors are also an interesting alternative. I think the sales of normal 24-degree stock motors will decrease in favor of the

new, rebuildable motors. I don't know if they are truly tamperproof, but it looks like a good and safe solution for fair racing.

RCCA: What are Team Orion's plans with respect to motors and increased performance?

PN: We have a lot of new ideas on the drawing board. The biggest news is a completely new line of motors based on the revolutionary Top design. Top is a company that manufactures super-high-quality electric motors, and we have helped them develop a totally new motor for R/C cars. Darren Westman and Oscar Jansen have worked on the project a lot, and we are now ready to produce the first motors using Top's advanced technology. We will have a rebuildable stock, a 24-degree stock, a 5-degree stock motor—all designed for the U.S. market—a series of bushing modifieds and machine-wound ball-bearing modifieds, and our famous pattern-wound modified motors will also be available in the new Top teardown design. I think that the new motor will surprise a lot of people and will start a new trend in motor design and performance.

RCCA: What are some of the things you like to do to get your mind off work?

PN: I have been pretty busy since I started Team Orion! I like spending time with my family, seeing some cool movies, traveling around the world. I have a super-nice wife and two lovely cats. Because I love the U.S., we got married in Las Vegas and honeymooned in California!

I like R/C cars a lot, and I also enjoy flying electric-powered R/C airplanes when I have the time.

RCCA: What does the future hold for Team Orion?

PN: The future is a lot of innovative products for beginners and serious racers; always increasing the existing standards and having satisfied customers. I would like to thank all the people who use Team Orion products; with their help, we are working hard to offer products that provide maximum fun as well as maximum performance. We are also supporting the hobby as much as possible to ensure that R/C cars continue to grow and give a lot of pleasure to all the hobby racers.

RCCA: Thank you, Philippe; continued success to you and everyone at Team Orion. •

Speed Shop



PHOTOS BY GEORGE M. GONZALEZ

Traxxas 2.0-inch Touring Car Wheels and Foam Inserts



Traxxas' new 2.0-inch Satin Finish touring-car wheels are a stylish way to increase the performance of your sedan. The deep-dish BBS-style wheels are extremely realistic; they look as if they're made from machined aluminum. The wheels also feature a 2.0-inch diameter and are designed to accommodate standard-width 1.9-inch tires. The slightly taller diameter requires the tire to stretch onto the wheel, and this lowers the sidewall and increases the contact patch. The wheels are a standard offset design and are intended for Traxxas, HPI, Tamiya and other vehicles that use wheels with the same offset.

Traxxas' molded tire inserts for 1.9-inch treads are the perfect complement for the Satin Finish wheels. The molded inserts fit the shape of the wheel and the contour of the tire perfectly for superior tire support, thereby ensuring that the tires will not flex, stretch or distort; all characteristics that can cause erratic handling.

Part no.—4827 (Satin Finish wheels), \$TK; 4879 (tire inserts), STK.



Acer Racing ULTRA-O Professional Series O-rings

O-rings' performance is a significant contributor to a smooth, properly operating damper because they are in constant contact with the shock shafts. It is in this vital area that Acer Racing's new ULTRA-O professional series O-rings can make your shocks perform smoothly and last longer between rebuilds. Acer Racing's O-rings are made of a special, internally lubricated aerospace material that, according to Acer, has up to 295 percent less coefficient friction and 228 percent greater tensile strength than silicone O-rings. In short, the ULTRA-O professional series O-rings are smoother and longer-lasting than conventional silicone O-rings.

Price—\$4/package of 10.



Hammad Ghuman Machined Idler Gears for Associated and Losi Vehicles

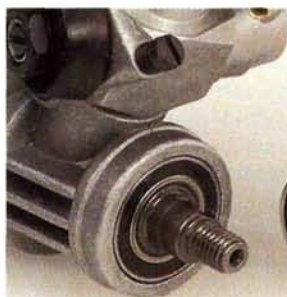
Hammad Ghuman's highly anticipated idler gears for Associated vehicles are now available. The idler gears are individually precision-machined from solid space-age polymer for extra-long life and high-speed performance. The RC10GT version features a unique, one-piece design with built-in shaft that can never loosen or slip. The precision-machined idler gears are available for all Associated vehicles equipped with a Stealth transmission. For more information, Call your hobby shop or Hammad Ghuman, (518) 782-9255.

Part no.—1526 (RC10, 10T, T2, GT and DS), 1527 (B2, B3 and T3); \$9.95.

Team Kinwald Dual Seal Bearing

Team Kinwald's new 9x17x5mm non-flanged Dual Rubber Seal Bearing is a direct replacement for the single rubber-seal bearing on O.S., Dynamite and other .12 engines that use a front crankshaft bearing of the same size. Designed to reduce air leaks for better engine compression and more consistent performance, the dual seal bearing also eliminates fuel leaks for cleaner running. If you've ever struggled to tune an engine that was sucking air, you know the value of a properly sealed engine. The Kinwald bearing will help keep your mill air-tight and reduce chassis clean-up time.

Part no.—TK3085; \$6.99.





RACER news

By George M. Gonzalez

RACER PROFILE

Daryl and Duane Silva

VITAL SIGNS

DUANE

Age: 20

Occupation: Team Associated R&D technician

Hometown: Fountain Valley

Years racing: 11

First car: Tamiya Hornet

Favorite class: 1/10 oval

Favorite track: Western R/C

Favorite race: Snowbird Nationals

DARYL

Age: 20

Occupation: Aviation product control

Hometown: Fountain Valley

Years racing: 11

First car: Tamiya Hornet

Favorite class: 1/10 oval

Favorite track: Thunder Raceway

Favorite race: Snowbird Nationals

Sponsors (for both): Associated, Reedy, LRP, Jaco, Pro-Line, Protoform, Kimbrough, Hitec, Raceway Mfg., IRS, MC/RC



This month, we're giving you two "Racer Profiles" for the price of one. Team Associated factory driver Daryl Silva and his not-so-identical twin brother, Duane (who happens to be Daryl's trusted mechanic), are well known around the oval-racing circuit and have been called the "dynamic duo" of oval racing. Yes, we know; some people refer to the Hand brothers—Kirby and Ryan, who drive for Team Trinity—as the "dynamic duo" of oval racing, so I guess we'll have to interview the Hand brothers next to find out which of these driver/mechanic teams deserves the title. Better yet, maybe they can settle the dispute at the track... I smell a challenge.

R/C Car Action: I'm sure our readers will enjoy learning a little about your contributions to oval racing, as well as your involvement with the development of Team Associated's latest on-road kits. Now, who does the wrenching and who does the driving, or do you both do a little of each?

Duane: I drive a bit, but I mostly wrench on the cars and motors for the team and for my brother. Daryl mostly drives, but he does perform technical stuff like putting the decals on his cars.

RCOA: How did you guys get into R/C? Did you both jump in at the same time?

Duane: We both got involved with R/C racing about 11 years ago. Our father and older brother got us started, and we've been doing it ever since.

RCOA: What were some of the racing classes that you both competed in before deciding to become masters of the oval?

Daryl: We both started out racing off-road and then ventured into dirt oval. We raced in both classes until about 5 years ago, when we discovered a carpet oval track in Lodi, CA, and we've been hooked on oval racing ever since.

RCOA: Are you full-scale NASCAR fans? Who are your favorite drivers?

Duane: Yes, we are NASCAR fans. I like Bobby Labonte and Tony Stewart of Joe Gibbs Racing. My brother Daryl likes Rusty Wallace.

RCOA: How closely related is R/C oval racing to the real thing?

Daryl: I think that R/C oval racing is closely related to full-scale NASCAR racing because of the interest in and excitement about going fast. There are a lot of NASCAR crew members and drivers who play with this hobby. NASCAR racing and R/C oval racing are both growing a lot, so the interest is there.

RCOA: Many drivers believe that wrenching skill is the single most important element in R/C oval racing; others believe that driving skill is the most important. What are your thoughts?

Duane: I believe that wrenching skills are important. Working on the

car, trying to find the right setup for it and keeping it in good shape are all very important. Driving is also important because you need to be consistent, and if the car is not working as well as it should, you still need to be able to get it around the track. I think that the scales are balanced; to go fast, you need both attributes.

RCOA: Some people believe that oval racing has become a motor-and-battery war, and that the cost of competing has spiraled out of sight. Do you agree?

Daryl: The price of racing has gone somewhat out of control. The people who race oval just want to go fast, and they will pay to do so. The big problem behind the motor-and-battery war is that everyone wants to be sponsored. Most racers are worried about the best motors and the best batteries, and they lose sight of the two most important aspects of racing: wrenching and driving skills. The best motors and the best batteries will only get you into a wall a lot quicker if you can't drive the car around the track in the first place!

RCOA: Duane, I understand that you work at the Team Associated facility, and that both you and your brother help chief designer Cliff Lett with research and development of some of the company's on-road products. Can you tell us about that?

Duane: We did a lot of research and development on the RC10L3 and RC12L3 oval cars, and we had an active role in testing parts for both of them.

I work with Cliff Lett in product development. I am presently receiving training on some of the computer software we use in design. I have learned a lot about the various steps in the development process with the TC3 touring car and helping to make the instruction manual; that kind of thing.

RCOA: Will the Silva brothers do any touring-car racing now that Team Associated has released the TC3?

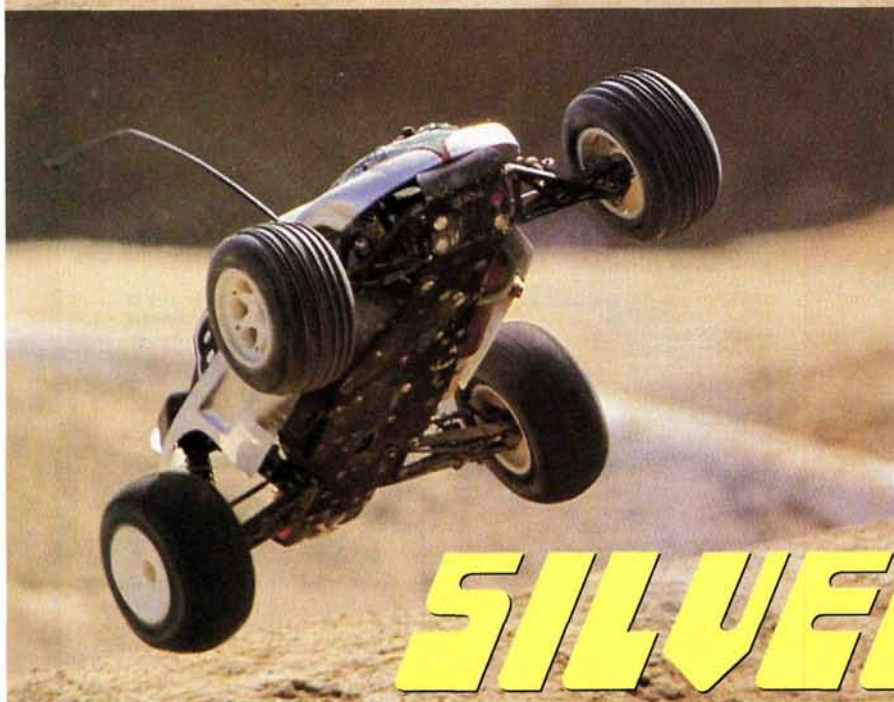
Daryl: Both Duane and I have been racing touring cars for the last few months. We'll be racing a lot more when the TC3 is available.

RCOA: Thanks for your time, guys. Good luck with your racing.

*Addresses are listed alphabetically in the Index of Manufacturers on page 209.



"TTR" wins
the jackpot
in Vegas



SILVER STATE

NITRO



Left: Team Associated factfactory pilot Billy Easton puts on his war face. Below: Richard Saxton and Jason Ashton duke it out on the drivers' stand. It looks as if Richard likes to have a mouthful of bubble gum when he races.



by George M. Gonzalez

EVERY YEAR, THE TOP nitro off-road drivers from around the world flock to Las Vegas, NV, for the Silver State Nitro Challenge, which is actually a warmup for the ROAR 1/10- and 1/8-scale Off-Road Fuel Nationals. Hosted by Western R/C Raceway, the Silver State Nitro Challenge has become the premier off-road racing event for fuel-powered 1/10- and 1/8-scale vehicles. Consequently, drivers from around the globe congregate to determine which team will emerge victorious to gain the bragging rights that come with winning a major championship.

This year's event proved exciting, as Thunder Tiger Racing (TTR), Kyosho, Mugen and Laro all introduced new 1/8-scale 4WD buggies and fielded teams who were gunning for that first big win of the season. As usual, surprises were around every corner, but there could be only one winner! In this case, the winning driver was the one who was most prepared and who quickly mastered the extremely rough track conditions. Read on to find out how the whole thing went down.

PHOTOS BY GEORGE M. GONZALEZ

CHALLENGE

QUALIFYING AND A-MAIN OVERVIEW

• **V8-scale Buggy—60 minute A-main.** TTR factory drivers Richard Saxton and Billy Easton were the only ones who drove the new pro-level EB-4 1/8-scale 4WD gas buggy. Saxton set the pace during qualifying and finished TQ—not bad for a maiden voyage. Easton didn't have it so easy; technical problems prevented a good run, and that meant he had to start in the D-main and work his way up the hard way to the A-main. Team Mugen driver and Silver State Nitro Challenge reigning champion Mark Pavidis qualified in second driving Mugen's MBX-4, and Team Kyosho driver Jason Ashton qualified in third with Kyosho's MP-6 International. One TTR, two Mugens and eight Kyoshos filled out the A-main.

During the first half of the hour-long A-main, spectators, mechanics,

other racers and yours truly ranted and raved as Saxton, Pavidis and Ashton fought it out. For each, a win would earn his sponsor serious bragging rights, since the Silver State Nitro Challenge is the biggest 1/8-scale buggy race on the West Coast.

Even after numerous pit stops, the three were on the same lap and within a fraction of a second as they swapped positions on almost every lap. On lap 50, however, Pavidis' luck suddenly ended due to technical problems. Four laps later, Ashton took a long and lonely walk down the drivers' stand when equipment trouble took him out of the race as well. Saxton now led by a huge margin.

But Saxton's comfortable lead didn't slow him down at all. He continued to drive as though his life depended on a win for TTR. Consequently, there wasn't a double or triple jump in his path that he didn't sky, much to the delight of the spectators.



The Facility The '99 Silver State Nitro Challenge was held at western R/C Raceway in Las Vegas, NV, which is also the site of the NORRCA Road Course Nats, Paved Oval Nats and the up-and-coming ROAR 1/8- and 1/10-scale Off-Road Fuel Nationals. Judging by these high-caliber events, Western R/C Raceway knows how to run big races. Ironically, first-time visitors probably had difficulty finding the place, as I did. The facility is between some sort of heavy-equipment junkyard and an industrial train terminal and can only be accessed from a dirt road off a highway.

Once you look past its location, the raceway has a giant, slightly banked paved oval track that can easily accommodate 1/4-scale cars. The intricate infield is used for road-course racing and both 1/10- and 1/8-scale nitro and electric cars are raced there regularly. The large off-road track with separate drivers' stand directly behind the fenced-in on-road track was transformed into a supercross-style course with huge jumps and rhythm sections around every corner. The facility also has a fully stocked hobby shop, snack bar and all the usual conveniences. If you're ever in Las Vegas, stop by Western R/C Speedway to check out the action.



The top 3

Left: 1/10 Truck top three (left to right): Greg Degani (third), **Billy Easton** (first) and Brandon Rowland (second). Center: 1/8 Buggy top three (left to right): Kris Moore (third), **Richard Saxton** (first) and Atsushi Kawamoto (second). Right: 1/8 Truck winners (left to right): Edward Wong (second), **Jim Silvay** (first) and Peter Head (third).

The driver/mechanic relationship

To win at this level of competition, the driver and the mechanic must be perfectly "in tune" with each other: the mechanic must be a good driver, and the driver must be a good mechanic. Many A-main contestants were fortunate to have the best mechanics in the industry pitting with them. In fact, most of the mechanics were also talented racers whose names appear on A-main rosters at major racing events featured in *R/C Car Action*.

So what goes on in the pits during an hour-long A-main? For the most part, a lot of refueling. Most drivers brought in their cars for refueling after approximately 5 minutes of racing. The mechanics, however, determined exactly when drivers came in for a pit stop. After all, the mechanics kept an eye on their drivers' lap times as well as on the vehicles' fuel consumption. A typical fuel stop took less than 3 seconds and, if timed correctly, had very little or no effect on a driver's position.

Jason Ashton (left) and his mechanic, Rocky Hardcastle, minor repairs were also performed; however, engine malfunctions and major enjoy the quiet suspension-component failures caused many DNFs. For most, the track conditions were brutal, and this turned the race into a battle of attrition.

The only other adjustments made during a race were to an engine's carburetor and occasionally to a vehicle's brakes and rear wing. Of course, some minor repairs were also performed; however, engine malfunctions and major enjoy the quiet suspension-component failures caused many DNFs. For most, the track conditions were brutal, and this turned the race into a battle of attrition.



SILVER STATE NITRO CHALLENGE WINNERS

	FIN.	QUAL.	DRIVER	CHASSIS	ENGINE	PIPE	RADIO	TIRES (F/R)	FUEL
1	1	1	Richard Saxton	Thunder Tiger	HPI/Top	NovaRossi	JR	Pro-Line	O'Donnell
2	2	8	Atsushi Kawamoto	Kyosho	O.S.	Kyosho	Sanwa	Kyosho	Kyosho
3	3	9	Kris Moore	Mugen	O'Donnell/Rex	Nova Rossi	KO	Pro-Line	O'Donnell
4	4	5	Yuuichi Kamai	Kyosho	O.S.	Kyosho	Futaba	Kyosho	Kyosho
5	5	7	Chad Bradley	Kyosho	O.S.	Kyosho	Hitec	Pro-Line	O'Donnell
6	6	10	Greg Waller	Kyosho	Top	Top	Airtronics	Pro-Line	O'Donnell
7	7	6	Chris McElroy	Kyosho	NovaRossi	NA	Airtronics	Pro-Line	O'Donnell
8	8	4	Dave Henry	Kyosho	O.S.	Kyosho	Futaba	Kyosho	FSR
9	9	3	Jason Ashton	Kyosho	Pro	NA	NA	NA	O'Donnell
10	10	2	Mark Pavidis	Mugen	Top	Top	Airtronics	Pro-Line	O'Donnell
1	1	6	Jim Silvay		O.S.	Paris			O'Donnell
2	2		Edward Wong	Kyosho	O.S.	Kyosho	KO	Kyosho	FSR
3	3	1	Peter Head	Kyosho	O.S.	Kyosho	KO	Kyosho	FSR
4	4	5	Tom Pegasus	Kyosho	Picco	Paris	JR	Kyosho	O'Donnell
5	5	3	Holli Bechard	Kyosho	Picco	Paris	JR	Kyosho	O'Donnell
6	6	7	Jim Williams	Kyosho	O.S.	Kyosho	Futaba	Kyosho	O'Donnell
7	7	4	Bob Fricker			Paris		Kyosho	O'Donnell
1	1	3	Billy Easton		Top	Associated	Airtronics	Pro-Line	O'Donnell
2	2		Brandon Rowland	Associated	Thunder Tiger	Associated	Airtronics	Pro-Line	O'Donnell
3	3	5	Greg Degani	Associated	Top	Associated	Futaba	Pro-Line	O'Donnell
4	4	1	Austin Dvorak	Associated	Top	Associated	Airtronics	Pro-Line	O'Donnell
5	5	6	Richard Saxton	Associated	HPI	Associated	JR	Pro-Line	O'Donnell
6	6	10	Adam Drake	Team Losi	NovaRossi	O'Donnell	Airtronics	Losi/Pro-Line	O'Donnell
7	7	9	Mark Pavidis	Associated	Top	Associated	Airtronics	Pro-Line	O'Donnell
8	8	7	Chad Bradley	Associated	Top	NA	Hitec	Pro-Line	O'Donnell
9	9	8	Jason Ashton	Associated	Thunder Tiger	NA	NA	Pro-Line	O'Donnell
10	10	4	Jeremy Kortz	NA	Dynamite	MIP	JR	Pro-Line	Blue Thunder

THE ULTIMATE PIT SP

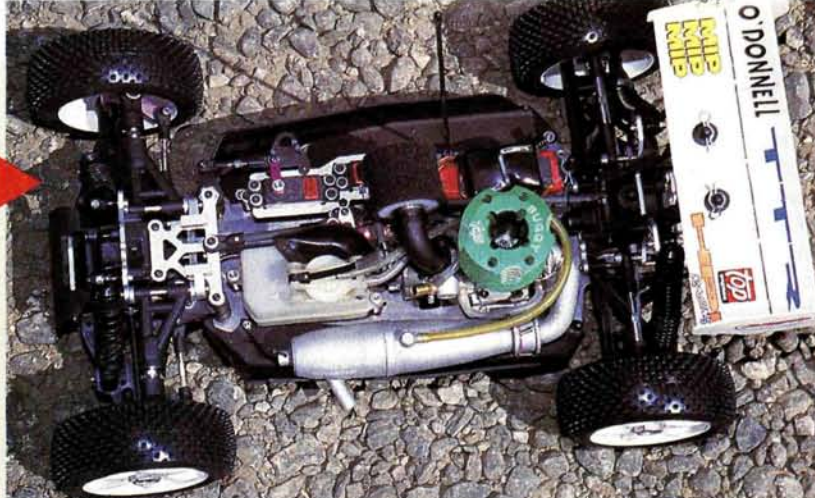
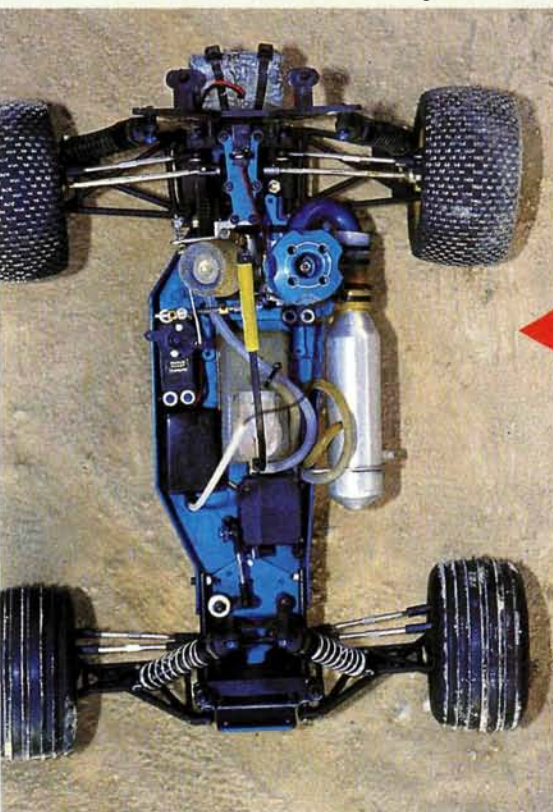


When you pull up the Team Serpent Network web site you pull into gas racing's ultimate pit space. Browse the on-line version of our 80-page, 200-photo Tech Book- a virtual gas car bible that puts 20 years of tuning know-how at your fingertips. Join the Cyber-Pit, a unique interactive web page where racers from around the world share tech information. Download our exclusive START datalogging software...for free. Or read the latest tuning tips in columns by the current World T.Q., the ROAR Champion, and other experts. TSN - get it dialed up, and get your car dialed in.



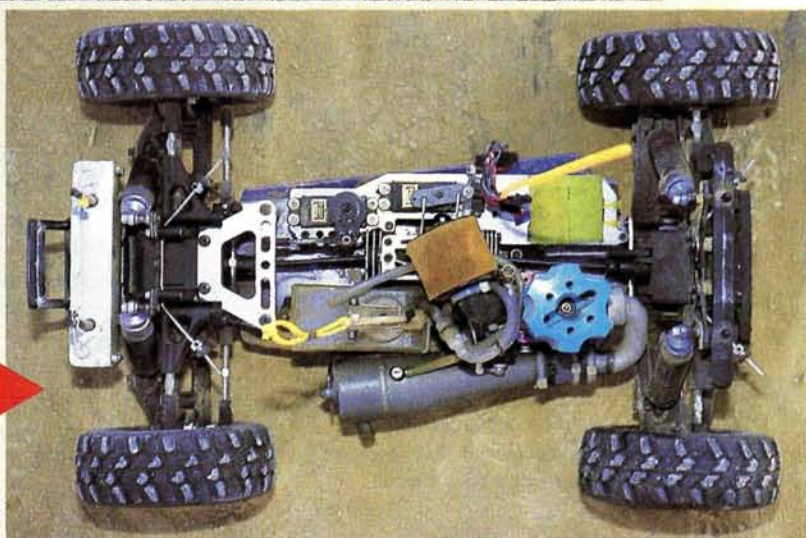
The Winning Cars

Right: Richard Saxton's top-qualifying and A-main-winning TTR EB-4.



Billy Easton's A-main-winning Team Associated RC10GT looks basically stock except for all the Factory Team blue stuff.

Jim Silvay's A-main-winning Kyosho Inferno ST—pretty serious stuff!



CE IS IN CYBERSPACE



www.serpent.nl

Serpent
EXCITEMENT IN THE FAST LANE

SILVER STATE NITRO CHALLENGE

Meanwhile, Team Kyosho driver Atsushi Kawamoto from Japan moved into second place, and Team Mugen driver Kris Moore, who had been bumped up from B-main, snuggled into third. This was basically the finishing order. Saxton ended with 124/60:22.01 for the championship, Kawamoto was second with 123/60:25.36, and Moore's 120/60:06.25 was good enough for third. If you're wondering, Billy Easton worked his way up to the B-main, where his car broke eight minutes into the 20-minute race.

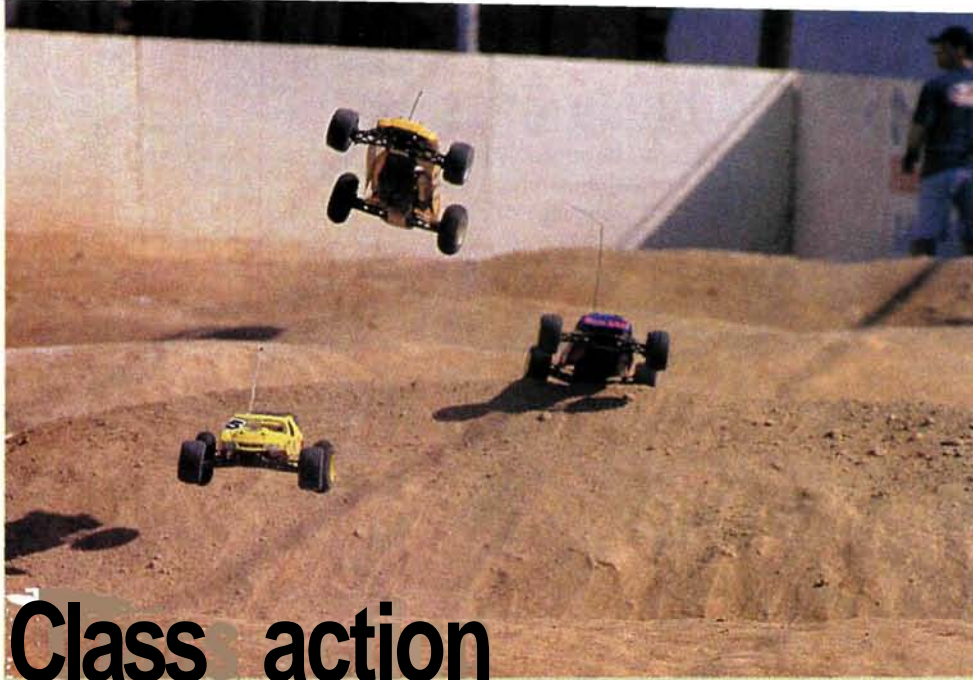


The legendary Steve O'Donnell and a Team Associated factory driver work on Mark Pavidis' 1/8 buggy on pit lane.

• **1/8-scale Truck—20-minute A-main.** Peter Head took TQ honors with his O.S.-powered Kyosho MP-5 truck conversion after barely edging out teammate Edward Wong, also driving a converted Kyosho MP-5. Holli Bechard—the only woman in the class—qualified third with her Paris/Picco-powered Kyosho Inferno ST.

The main event provided spectators with some close (and fun) racing, as the drivers mixed it up both on the ground and in the air. Thanks to an efficient pit crew and some smart driving, Jim Silvay's Kyosho Inferno ST soon passed traffic and was a full lap ahead of its competitors. Meanwhile, Wong settled into second and remained there throughout the course. Silvay's luck held, and he crossed the line first—a full lap ahead of Wong, who claimed second. TQ Peter Head settled for third. Holli Bechard was fifth behind Tom Pegasus—aka "Tom Cat."

• **1/10-scale Truck—60-minute A-main.** Team Associated driver Austin Dvorak quickly figured out how to get around the supercross-style track without destroying his truck in the process. After four rounds of grueling qualifying, Dvorak had earned TQ as well as the respect of his peers. During a 60-minute Main, however, being the TQ doesn't really amount to much other than the guarantee of a spot in the



Class action

Three racing classes are offered at the Silver State Nitro Challenge: 1/8 Buggy, 1/8 Truck and 1/10 Truck. The popular 1/8 Buggy and 1/10 Truck account for the majority of the contestants. The 1/8 Truck class unfortunately is dying, since Kyosho and most other manufacturers no longer produce purpose-built, 1/8-scale 4WD off-road racing trucks. As a result, very few people signed up for the class.

The 1/8 Buggy and 1/10 Truck contestants competed in four 15-minute qualifying rounds to determine which eight out of 10 would automatically make the A-main (the 1/8 Truck contestants competed in four 7-minute qualifiers). To make it into the A-main, the remaining drivers would have to be bumped up from a lower Main. A racer's best three qualifying times were averaged to determine a score that would be used to set the qualifying order or main-event standings. A driver's worst score was thrown out and only used in a tie.

The remaining two A-main drivers were actually the first- and second-place winners of the B-main. The top two drivers from each main were bumped up to the next main. So, basically, the better you qualified, the fewer bump-ups you had to face. This means that it was conceivable for a driver who qualified in the J-main to actually win the event. But to pull it off, that driver would have to win every single Main, including the final A-main. Sounds impossible, but Team Associated factory driver Mark Pavidis did exactly that last year. No major bump-ups were reported at this event, and that made things less dramatic.

A-main; the seventh and eighth qualifiers and even the first- and second-place winners from the B-main have just as much chance to win as the TQ.

During the first half of the race, Dvorak, Greg Degani, Richard Saxton and Brandon Rowland mixed it up in grand style, but Team Associated driver Billy Easton set the pace right from the start.

By the 40-minute mark, the first through fourth positions were divided by laps, not seconds. Easton continued to lead; Rowland was second, a full lap behind; Degani staked his claim on third—one lap behind Rowland—and Dvorak flanked the leaders in fourth. No surprises; the race ended in that order.

FINAL THOUGHTS

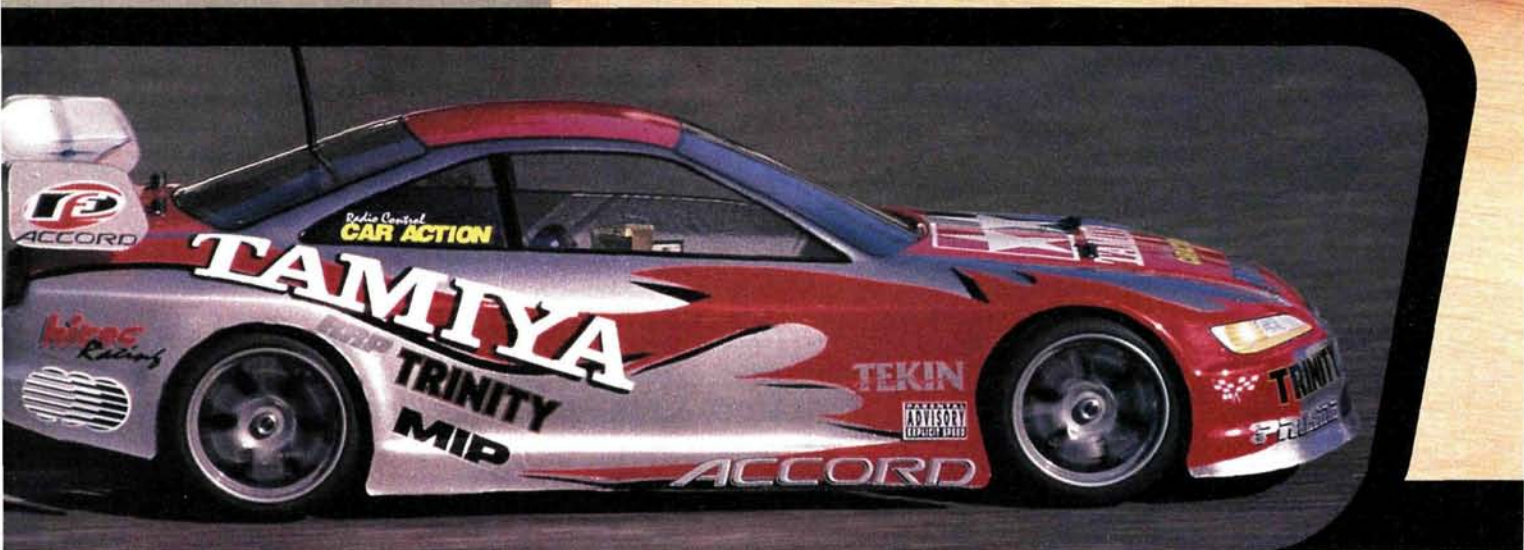
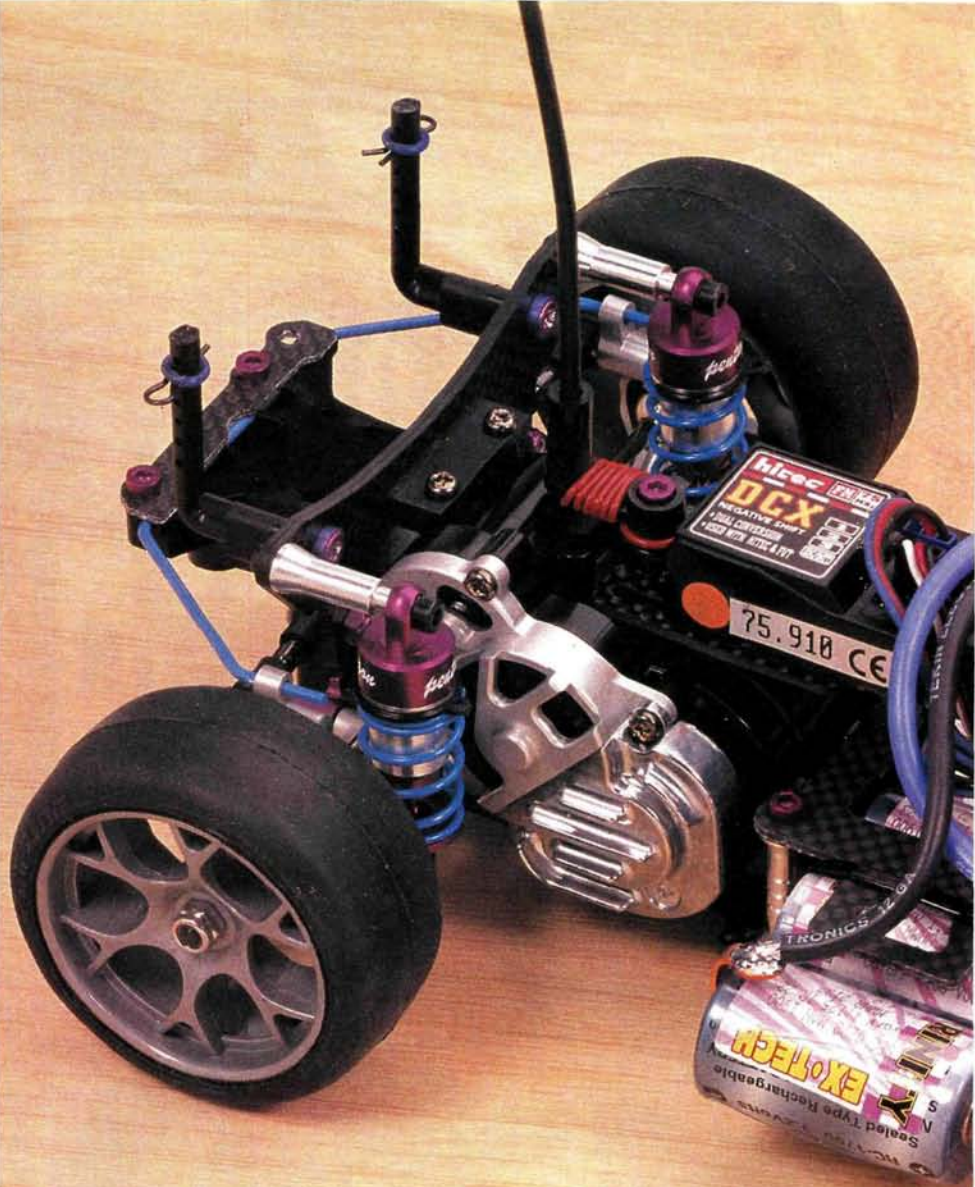
The Silver State Nitro Challenge went very well. Changing track conditions kept the drivers and mechanics on their toes throughout. The racing action was intense, and all the drivers went home with dirt in their hair and the smell of nitro in their clothing.

We congratulate all the winners and thank Western R/C Raceway for being great hosts. Good luck at the ROAR 1/10- and 1/8-scale Off-Road Fuel Nats, guys. Hope to see you all next year.



Team Kyosho flew in its racing team from Japan; these guys are fast!

The Dual Engine USA-1 in the June '99 issue was a complete success and, if the letters and emails we've received are any indication, got the adrenaline pumping for nitro fans everywhere. "But what about us electrics enthusiasts?" you ask. Don't think for a moment that I would let you down; I've dreamed up an electric project that is sure to get your heart pounding. This month, we have a full feature on a TAO3, and not just any old TAO3: this one has two motors and two batteries, so it looks like the dual theme is in full effect again! But I didn't stop



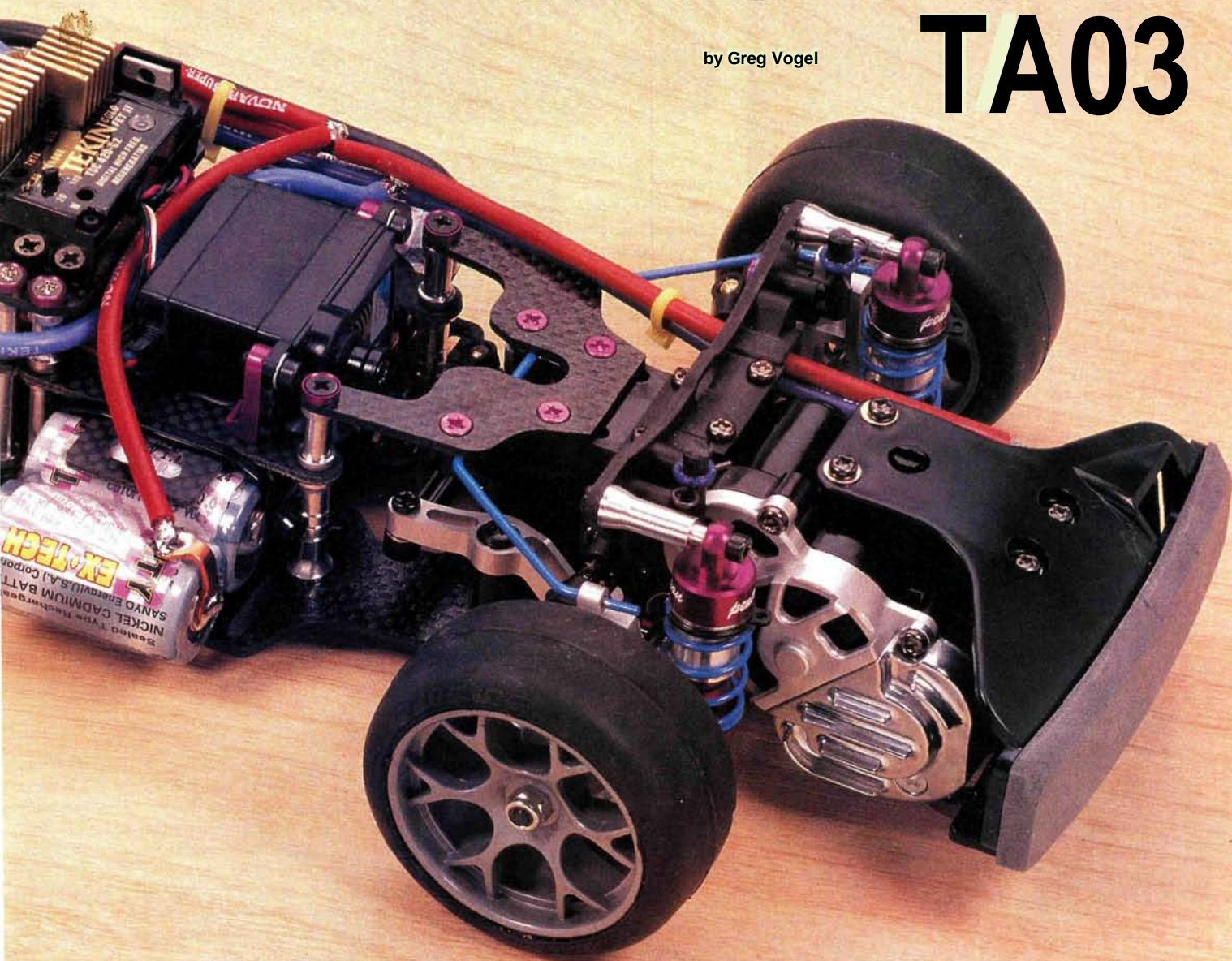
EXTREME

DRAG SEDAN

PROJECT

DUAL MOTOR TA03

by Greg Vogel



there. I also went shopping in the Cross Racing Equipment* catalog and picked up some goodies to spice up the project even more and help it cope with what I'm sure will be some fairly silly horsepower. Read on; I'll show you how easy it is to convert the oh-three to dual-motor power and build a real road rocket.

The big-dollar Dual Motor TA03 you see on these pages is, no doubt, an awesome car; but building one isn't in everyone's budget. We're not showing you this trick ride to entice you into building an exact replica, but rather to make you aware of the optional parts available for the car. You can pick and choose the parts you think look cool or will make your car perform better. And, memo to those of you who want a car like the one featured in this article, but who can't afford all the expensive goodies: this sidebar is for you. I had another TA03F kit sitting at home just screaming to be built, so I nominated it for the Sport version Dual Motor TA03. Before I built the Sport version, though, I had to pick up some parts to install the second motor. Here's your shopping list

"A" parts (front gearbox)—**part no. 50698.**

"G" parts (gear)—**50718.**

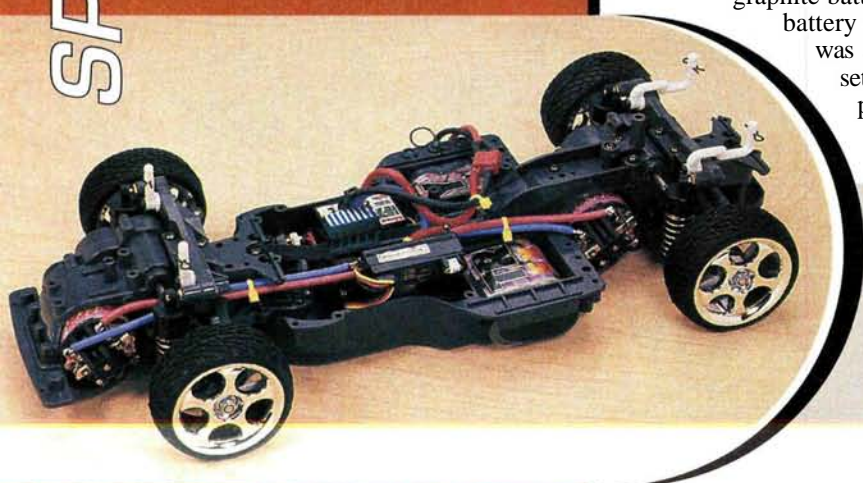
Gear tube—**53260.**

Ball bearing—**53008.**

Pinion—**53064.**

It's very easy to bolt on a second motor and gearbox assembly. Build the second gearbox just as you did the first. I used a front motor chassis. I simply installed the second unit onto the chassis as if it were the rear unit. It is not necessary to install the outer pulleys or belt. When installing the lower suspension mount, do not use the one with the motor guard. Use the rear suspension mount

Your only challenge (if you can even call it that) in building this Sport version is wiring the motors; I opted to wire them in parallel. That means I took the positive lead from each motor and soldered it to the positive on the speed



control, and I did the same for the negative. The Sport version with tub chassis only uses one battery, so that means run time will be a little less.

After hitting some insane speeds with the fully loaded Dual Motor TA03, I didn't think there would be any excitement left for the Sport version; boy, was I wrong. The fully loaded version only lasts about a minute on a full charge and is impossible to drive on a road course because of its massive power. The Sport version, on the other hand, is a blast to drive.

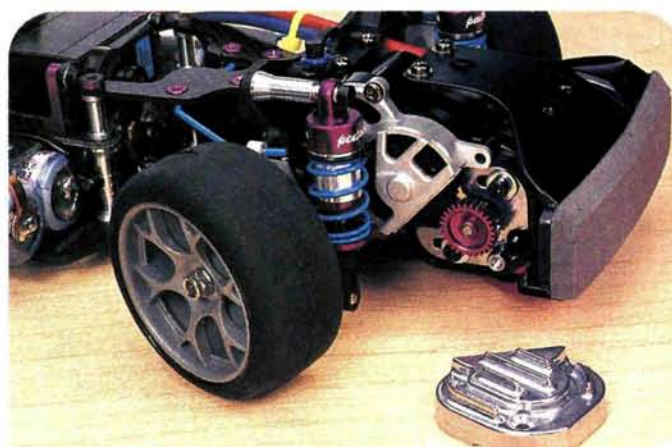
BUILDING THE BEAST

Since I planned to install not one, but two of the wildest motors I could find, along with 12 cells, I needed a chassis that could handle not only the weight of the packs but also the stresses of two powerful motors at each end. I chose a



This side shot of the battery-mounting system shows the posts that are used to support the battery plates. Tamiya posts are used on the outsides, and Cross posts support the middle of the plates.

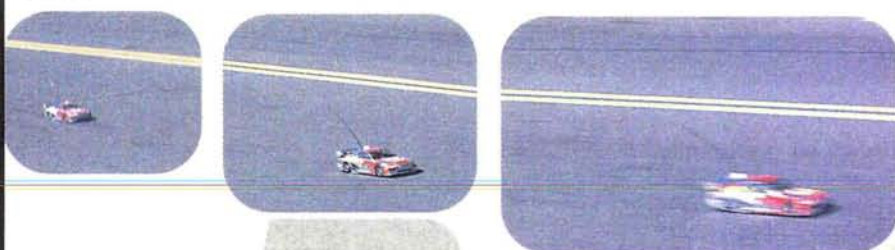
With two motors to share the work, I felt safe gearing the car to the moon. Robinson Racing gears were installed for perfect mesh and greater pinion choices—you won't find a 28-tooth pinion in the Tamiya catalog.



Cross RS chassis for the foundation of the car, and added Tamiya's* optional graphite battery hold-down plates to support the two 6-cell, side-by-side battery packs. All I needed to complete the double-battery setup was a drill and a countersink bit. The Cross chassis provides two sets of holes for a single pack; one set for "standard" battery position and another to move the battery back 1/4 inch. I

Before our trip to a local park for a speed run, I dropped in two mild mods and one battery to make sure that all the settings worked and that the car would track straight. With these safety checks out of the way, I broke in the two Trinity 6-turns and bolted them into the car. Using thick tie-straps, I then strapped in each battery pack. Twelve-gauge wire connects the positive side of one battery to the negative side of the other, so the batteries are in series; the ESC was soldered directly to the remaining terminals, and we were ready for takeoff.

Editor Peter Vieira stood at the head of a freshly paved strip of road



used the forward holes for the first battery and bolted the second battery holder into the second set. I then drilled new holes in the rear of the chassis for the back of the second battery brace. With the brace as a guide, I marked where the holes needed to be drilled and removed the plates. I then simply drilled the new

OPTIONS • PARTS

TAMIYA

- "A" parts (gear case)—part no. 50698.
- Carbon battery plate set (2)—53261.
- Aluminum motor heat sink (2)—53275.
- Steel suspension shaft set—53266.
- Carbon gear shaft (2)—53260.
- "J" parts (battery holder/steering mount)—50698.
- Tuned spring set (2)—53163.
- Sealed ball-bearing set—53265.
- 1150 ball bearing—53029.
- Stabilizer set (2)—53276.
- "L" parts (gears) (2)—50704.
- Urethane bumper set—53268.

CROSS

- Carbon-fiber chassis kit—TT-219.
- Turnbuckle set—TT-21.
- Body mounts—TT-119.

Aluminum parts

- Gear cover (2)—TT-20.
- Suspension arms (2)—TT-16.
- Steering knuckle (2)—TT-35.
- Steering bellcranks—TT-37.
- Shaft (2)—TT-07.
- Steering carriers—TT-40.
- Kingpins—TT-41.
- Rear hub carriers—TT-42.

MIP

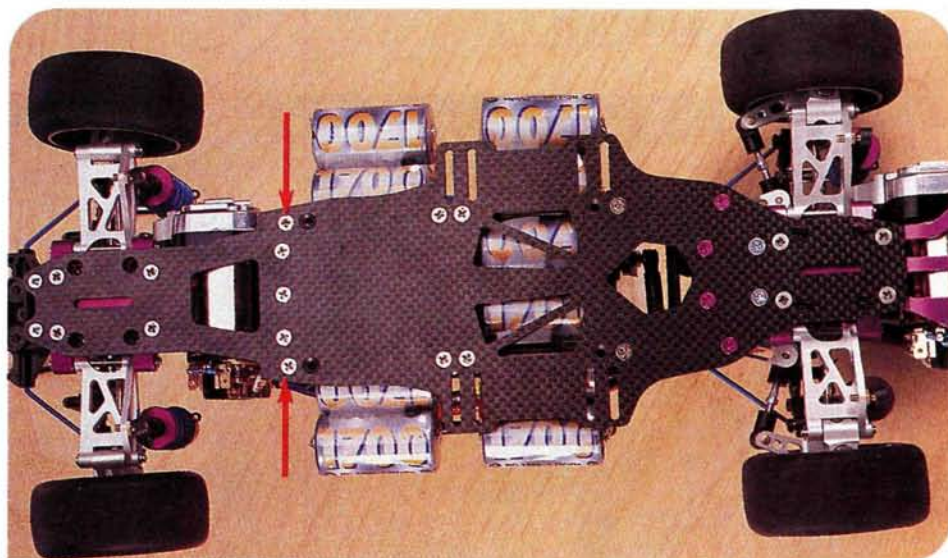
- Shiny CVDs (2)—224.

PENTAGON

- Lightweight Purple screw set—TS-601P.
- Heavy-duty damper—PP201P.

ROBINSON RACING PRODUCTS

- Gear set—RRP8800.



Here's a better view of the way I installed the second battery; the arrows point to the two holes I needed to drill to mount the second plate. It only took me five minutes to mark and drill these holes.

holes and countersunk them on the bottom of the chassis.

The gear cases were the next step in the building process. I opted to use the stock planetary gear differentials instead of the optional ball diffs. Since I had decided that this car was going to be an exotic sedan dragger rather than a road racer, I felt that ball diffs were unnecessary and, in fact, would be more likely than gear diffs to fail or slip. I did, however, use heavy diff grease inside to slow any diff action. With two mod motors spooling up in the trannies, I definitely did not want a diff to unload! With two motors, the drive belt that typically joins the front and rear gearboxes is not needed, so I removed it and the pulleys. So my finished product would be more attractive, I also trimmed off the protruding shafts. This took a real commitment to

the project because I used Cross aluminum upper shafts to reduce weight, and I really hated to cut them! I then assembled the drive train using Tamiya sealed ball bearings. Before installing the gears, I coated each one with White Lightning Teflon lubricant to reduce friction. A few more trick parts completed the tranny stage of assembly. Instead of using the stock plastic suspension mount/motor cage, I scrounged up a set of aluminum units from Trinity*. Sorry, speed junkies; these pieces are no longer available, unless you happen to spot some old stock on your dealer's wall. I also opted to change the gearing with Robinson Racing's* spur-gear adapter. I used the 48-tooth spur with a 28-tooth pinion. When the front gearbox was finished, I duplicated my efforts for the rear. Instead of installing the motor guard in

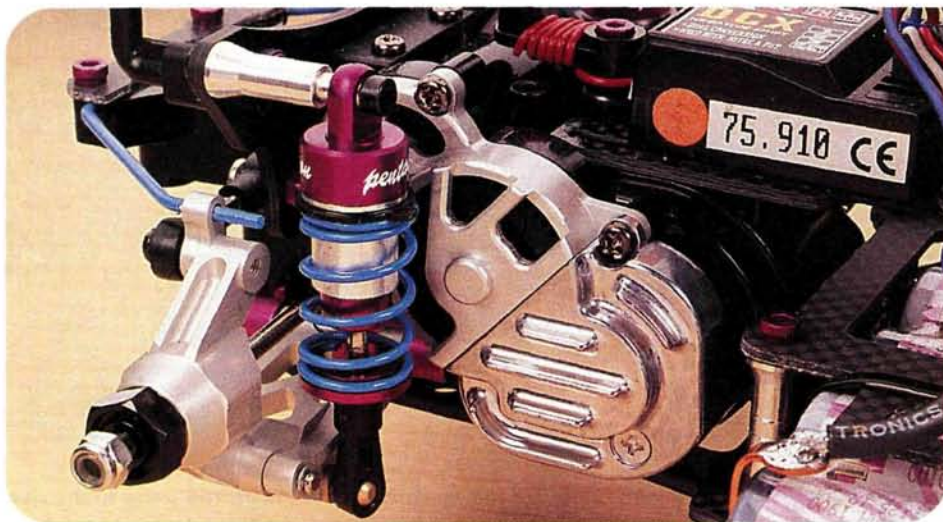
with the car in one hand and a video camera in the other, while I ran halfway down the strip to control the car. Staff photographer Walter Sidas and radar-equipped senior editor Steve Pond stood at the ready in the braking zone, some 500 feet away. I slowly pulled the throttle, and the car took off. Within 200 feet, I squeezed the trigger to full throttle. The TA03 was planted because of the extreme downforce created by the high speed. The car blew by me so quickly, I almost lost it, but I managed to keep it straight. Then it happened: our only fear—the dreaded glitch! The car went from straight to instant full left lock. I quickly gave it full right steering and brake to try to regain control, but it was too late. The car violently hit the square curb at more than 60mph! We gathered to make the long walk to survey the damage. Steve's radar told us the car had hit at 68.4mph before it veered into the curb. We got to the crash site thinking we were going to find a TA03 the size of a Mini Cooper, but my sorrow quickly changed to amazement: the car was almost intact! The front left wheel had broken off, which meant it absorbed a lot of the impact. The other sacrificial piece was the Trinity aluminum motor cage. This aluminum wonder saved the chassis; what a shame it's no longer available. The cage bent to about a 75-degree

angle; this crushed the brush hood of the motor and broke a small piece off the front of the gear case. The only other damage was that the batteries were ejected from the car, and some paint was missing from the body.

We speculated that the car had reached only three quarters of the speed it could have when the glitch occurred, so it was time to head back to the workbench and fix it. Luckily, I had everything I needed to fix the car, even a spare Trinity cage. For the second run, I hooked up a separate receiver pack so the receiver wouldn't draw power from the main battery or be susceptible to any power spikes. We geared up again for another ultimate speed run.

Everything was ready for go, and I took off. Cameras blazin' and radar gun firing, the car shot down the strip with blinding speed. After it blew by the gun, I let off the throttle so the car would slow itself. The magic number was 85.7mph. "Fast" doesn't even come close to explaining this car; *amazing, sick, insane*, are just a few words that come to mind (among others that I can't use in the magazine) to describe this drag experience.





As is the front, the rear suspension is precision-machined of aluminum. CVDs provide the drive from the trannies to the wheels, and Pentagon shocks provide damping.



The all-aluminum front suspension proved itself invincible, as it withstood a 60mph impact. Besides their strength, the parts are precisely machined with tight tolerances.



The Cross steering knuckles and hub carriers duplicate the stock geometry and increase precision. Plastic bushings prevent the aluminum kingpins from galling on the aluminum hub carriers.



The steering—though not used much on this dragger—has also been beefed up with aftermarket Cross components. To reduce slop, I added ball bearings.

the rear, though, I used Trinity's lower suspension mount (once again, no longer available—but too trick to pass up.)

From this point on, I built the car pretty much by the book, except that I installed a full Cross suspension system instead of the plastic kit parts. I used Cross aluminum arms, steering carriers, steering knuckles and rear hubs, held together with Tamiya's steel hinge-pin set (required). Cross upper camber links replaced the stock fixed links, and I also installed Tamiya's blue swaybar. Pentagon* dampers found their way onto each corner of the car, with Losi 40WT certified silicone oil inside and Tamiya blue tuned springs on the outside. MIP* shiny CVDs were the final touch.

I purchased a Tamiya steering bulkhead separately because it does not come with the tub kit, and I installed Cross's aluminum steering bell cranks with Tamiya steering tie rods linked up to the steering knuckles. The finished chassis looked like an aluminum and graphite masterpiece that should be hanging in an art gallery, not rocketing down a harsh asphalt runway.

POWER TRIP

What to do for electronics? Obviously, I had to drop in a motor and battery combo that was ridiculously fast. A pair of 6x1 (yes, 6x1; that's not a typo) D3.5 motors and two 1700mAh matched packs from Trinity got the nod. (I chose 1700mAh batteries because they have a higher voltage than 2000s.) Since we are going for speed instead of run time, 1700s are better batteries for the job. My next concern was which ESC could handle such a lethal combo. I opted for a Tekin* 420 speed control, a unit that has proven reliable in many 10-cell-plus projects. To control the scary-fast package, I used Hitec's* new 3D Lynx radio system with an Airtronics* 94157 servo for steering.

Last, I installed Pro-Line* yellow-compound radial tires to get the power to the ground, and a Protoform* Honda Accord body to keep the air moving smoothly over the car. Besides being one of the coolest-looking bodies around, the shape offers a lot of downforce, and I know this car is going to need it.

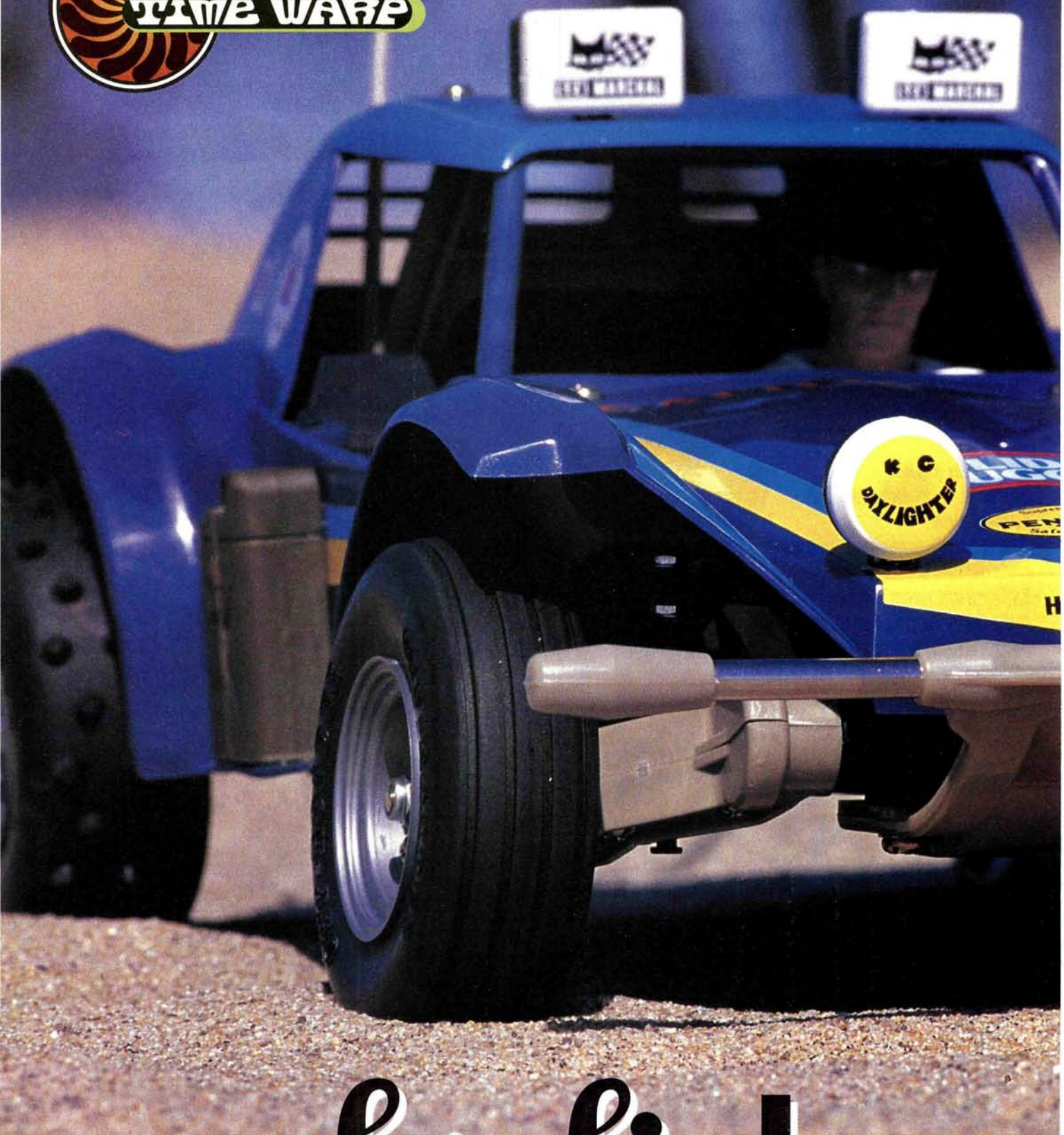
MISSION ACCOMPLISHED

My mission was to bring you an extreme sedan; a project that would blow your minds. I know it definitely went nuclear on ours! Is it necessary to buy all these parts to build a similarly insane speed-run drag sedan? Absolutely not. As you can see from the Sport TA03 drag sedan, you can build a vehicle that's just as exciting for low dough. The important thing is to have fun and go fast. And, uh, don't hit anything.

**Addresses are listed alphabetically in the Index of Manufacturers on page 209.*



TIME WARP

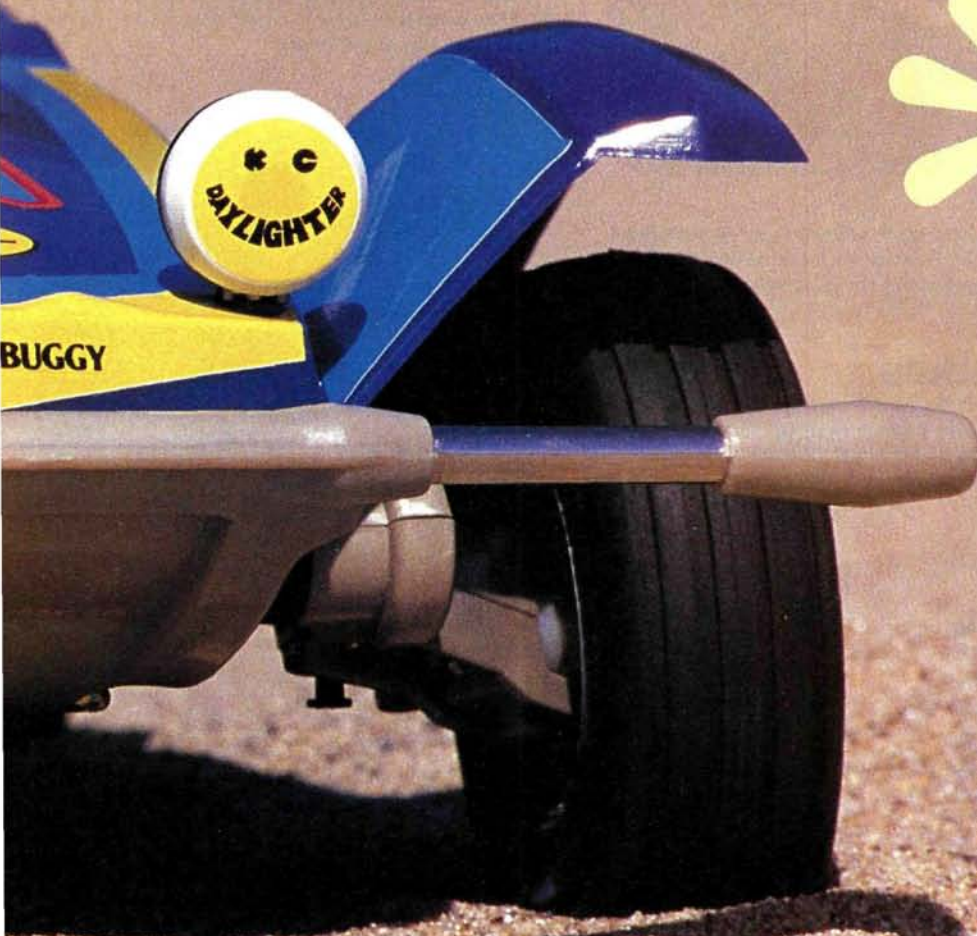


tamiya

holiday



'70s sand slinger



PHOTOS BY WALTER SIDAS

buggy

by Greg Vogel

it's time to reminisce about days gone by. Yes, R/C enthusiasts; I'm going to send you back to school for a little history lesson. Our topic of discussion today is the Tamiya* Dual Purpose Holiday Buggy. I was fortunate to stumble on an original kit in its original packaging at a trade show, and I scooped up this little piece of history for a mere \$30. It is one of Tamiya's earliest off-road kits, and it truly is one of the seeds from which the diverse R/C car hobby has grown.



BAJA BODY

On the inside cover of the instruction manual, Tamiya provides a description of the vehicles that inspired the Holiday Buggy. According to the manual, "dual purpose" dune buggies were the new, big thing in California at the time. People were taking W Bug frames, putting buggy-like bodies on them and running them on the streets and the sand. However, the Vee Dubs' stock chassis could not withstand such punishment so with the craze in full force, tube-frame chassis evolved. The tube frame was used, minus body, to race over sand dunes, and with just eight bolts, a body could be added for street use—hence the name Dual Purpose Holiday Buggy.

Tamiya's version is a decent replication of the real deal. For an old kit the details are excellent from the smooth fenders to the driving lights and rear-window louvers.



RIDE 'EM COWBOY

The Holiday even came with an interior set but it confused me; where in the world did they get the idea of putting John Wayne in the cockpit? The guy in the cowboy hat definitely adds character to the vehicle, even if he does appear to be sitting chest-high in a vat of crude oil.

POGO-STICK FRONT SUSPENSION

You won't find coil-over, oil-filled dampers here; ballpoint-pen-like springs provide the boing for the 2-piece trailing arms. A steel shaft passes through each spring to keep them positioned properly on the suspension arms. The top of each shaft is bolted to molded tabs on the chassis—an early incarnation of a shock tower. Despite the diminutive springs, the front end is stiffly sprung.



The 1999 Holiday Buggy

As the *Car Action* staff checked out the Holiday Buggy, we began to wonder: what if the evolution of off-road R/C car technology had stopped with the Holiday Buggy? What kind of hop-ups would we be adding to make it race-ready? This "Top 10" list includes fantasy parts from today's favorite option makers along with some forgotten names of yesteryear.

10. Kimbrough square-drive servo-saver.
9. Hammad Ghuman lightweight titanium front bumper tube.
8. Thorp Dirt Burner ball diff.
- 7.6. Giant-size MIP CVDs.
6. JG monster-truck conversion.
5. 4. Protoform "Holiday Ripper" Lexan body.
- Tamiya "Race Tuned" rear fiberglass leaf springs of various thicknesses.
3. Hot Trick aluminum suspension arms—anodized red, of course.
2. Trinity 380-size Paradox Pro.

... and the **NUMBER ONE** Holiday Buggy hop-up is:
Optional **RPM** cowboy hats for the driver, available in black, brown and dyeable natural.



FLEX-A-GLASS

As with the front suspension, the rear suspension system is completely undamped. Spring action comes from the flexibility of a single fiberglass leaf plate. There are no rear hubs to speak of, as the rear axles simply pass through the chunky suspension arms. Without rear hubs or camber links of any type, the rear wheels swing in the same arc as the suspension arms, thereby causing some dramatic camber changes. At full extension, camber measures a whopping positive 9 degrees, and at maximum compression, a mere negative 1 degree. I do have to say that the universal joints that link the non-diff to the rear hubs are nice pieces of work. Gee, do ya think they're strong enough to withstand the mighty torque of that 380 mill? A single bushing in each rear suspension arm supports the axles.

NINE CELLS!

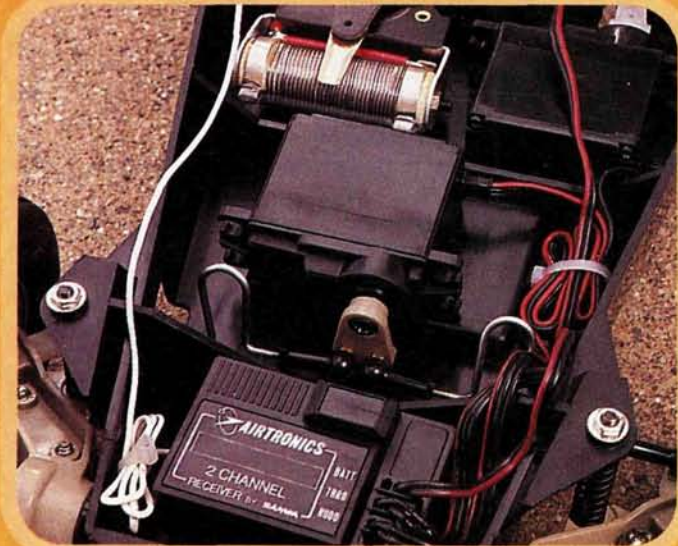
Don't be too impressed; the Holiday Buggy uses five sub-C cells to power the motor and four AA cells to power the receiver and servos. Back in the "Holi"-day, the battery eliminator circuit (BEC) had not yet been invented. As you may recall (but you'll be excused if you don't), BECs were required to "step down" the battery current headed to the receiver, which could not handle the power of a 6-cell pack (a BEC eliminates the need for a separate receiver pack—hence "battery eliminator circuit"). Ironically, the Holiday Buggy holds only five Ni-Cd cells that supply the same voltage as the four AAs used to power the receiver, so in this case, the receiver would work just fine even without a BEC. Modern receivers feature built-in BECs, and this explains why most of us don't think twice about them.

STYLIN FRONT BUMPER

Remember the days when front bumpers were the cool things to have? Neither do I, but at some point, everyone had a huge hunk of plastic protruding from the front of their vehicle. The Holiday fully exploited the craze with its chrome tubular bumper that had pencil-eraser-like plastic ends.

GO-GO GEARBOX

Check out the wide open gearbox that just invites harmful pebbles inside. The only thing sealed on this transmission is its fate: total destruction. At least there won't be any differential problems, since there is no differential—just a solid axle through the lower gear. And is that a 380 motor? Yeah, this little baby pumped out enough speed ... for your dog to catch it and chew it up. At least Tamiya spec'd an aluminum motor plate.

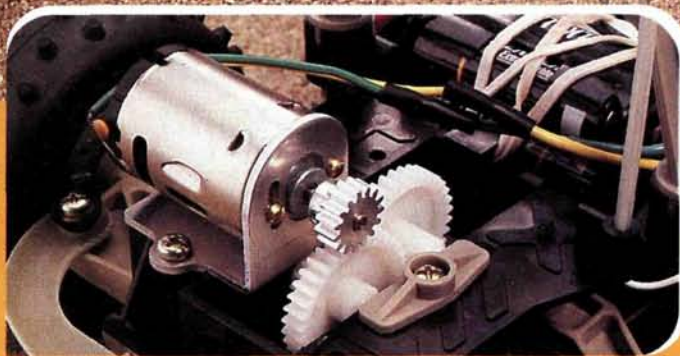


OLD MEAT

The rear tires on the Holiday were the treads of choice way back when. Mounted to 1.8-inch rims, these spiked bad boys could lay down the traction. Check out the gigantic sidewalls; I don't think today's truck tires have sidewalls that high.

WIPER POWER

Tamiya really had something with the Holiday Buggy's MSC; thanks to the wound coil design, its operation was very smooth, unlike today's "3-step" jobs. Apparently, even bullet-connector technology had yet to be developed back in the Holiday Buggy era; the MSC is attached to the motor by simply twisting the stripped leads together and "insulating the joint with tubing.



SAVE ME!

This vintage off-roader predates servo-savers, but Tamiya ingeniously safeguarded the frail servos of its day by bending flexible loops into the wire tie rods. Notably, the kit includes servo horns that have a square opening for the block-shaped output shafts servos used back then. An additional horn was also supplied for the then-new servos with splined output shafts.

There you have it; the roots of our hobby. It's amazing to see how far R/C has come. The Holiday Buggy was really little more than a motorized scale model, and the fact that it could be controlled via R/C was novelty enough; top speed and off-road prowess weren't even a concern. Today, even the most playful off-road cars are purpose-specific; they're built from the ground up for exceptional performance and durability, with nary a scale body in sight. Believe me, I'm glad the technology has improved, but don't you kind of miss cars that looked like this one?

* Addresses are listed alphabetically in the Index of Manufacturers on page 209. •

Need to know what's new? What works well and what doesn't? This section is devoted to objective reviews of all R/C car accessory items. From gears and wrenches to motor brushes and shock springs; if you can use it with your R/C vehicle, you'll find it critiqued on these pages.



184
RRP Nitro RS4
Gear Adapters



186
KO PROPO
EX-it Presto



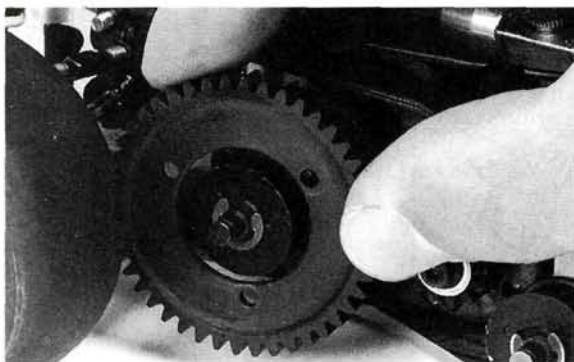
188
Team Kyosho
Carrying Bag

ROBINSON

Nitro RS4 Gear Adapters Another fine mesh

Robinson Racing Products*, well-known for producing exceptional gear sets, has developed a new, quick-change, 32-pitch clutch/spur conversion gear set for the HPI Nitro RS4, including the RTR version.

The set consists of a one-piece, steel, 17T clutch bell, "Super Tuff" 56T spur gear, and a machined aluminum, purple-anodized spur adapter that delivers a drive ratio of 3.291:1—which will give your Nitro RS4 a bit more top end than the stock 3.384:1 gearing. Complementing the conversion set is a host of optional clutch bells and spur gears that will allow avid tuners to set up their gear ratios from 2.88 all the way down to 3.625. The 32-pitch gears allow you to make the changes in smaller increments than the kit's standard "1 module" (25.4 pitch) gears, so you can get that perfect setup.



Once the belt has been removed, the RRP gear easily passes over the drive pulley.

Unfortunately, you cannot use the other gears on the RTR version because of the fixed engine mount on the Nitro Star 15—unless you change the mounting system or replace the engine. But don't let that dissuade you from using the conversion set. It allows you to exchange the cast-aluminum clutch bell for a machined-steel unit, and the high quality of the spur and the purple-anodized hub is well worth the investment.

The set is a direct bolt-in replacement that installs without modifications to the chassis or drive train. In fact, it's so easy, you don't even have to remove the right rear tire from the car! However, if you have purchased the optional center belt tensioner, it must be removed first. Once installed, the spur gear is easily changed by removing the exterior belt, which allows the spur to pass over the pulley once its three mounting screws are removed. On the track, the spur and adapter ran very



Robinson also makes gears to mesh with the stock HPI clutch bell; note how much finer the 32-pitch option gear (left) is than the 25.4-pitch piece.

true with no sign of wobble or runout—a hallmark of Robinson gears. The set held up to the rigors of a dirty parking lot and a heavy throttle/brake finger. The gears actually outlasted the rear belt, which was destroyed by the track conditions during testing. Robinson always produces a fine product, and the HPI conversion set is no exception. —Doug Huse

LIKES

- Makes any Nitro RS4 easier to work on.
- Adds a little color to the car.
- Increases gearing options.

DISLIKES

- None.

Product no.

- RS4 Nitro 32P conversion set—part no. 1536.
- RS4 32P16T clutch bell—1516.
- RS4 32P17T clutch bell—1517.
- RS4 32P 18T clutch bell—1518.
- RS4 32P52T spur—1552.
- RS4 32P54T spur—1554.
- RS4 32P56T spur—1556.
- RS4 32P58T spur—1558.



If this were in color, you'd like the way the purple gear adapter adds some color to the Nitro RS4. Until then, you'll have to work the ol' imagination.

AVAILABLE GEAR RATIOS

SPUR	52	54	56	58
CLUTCH BELL				
16	3.25	3.38	3.50	3.63
17	3.06	3.18	3.29	3.41
18	2.89	3.00	3.11	3.22

KO PROPO

EX-11 Presto

High-tech features, down-to-earth price

You're in the market for a new FM radio and don't want something that requires a bachelor's degree in computer science to understand; nor do you want to carry around an LCD screen the size of a miniature television that eats batteries the way a 426 Hemi goes through fuel. Most important, you don't want to have to sell your R/C cars just to afford it. Enter the KO Propo* EX-11 Presto.

The Presto is a mid-price, computerized, 4-channel FM system that carries an impressive number of features, including a couple that other manufacturers reserve for their flagship radios. It's available on 27 and 75MHz, has 3-model memory, an easy-to-read LCD screen, simple-to-use programming and ergonomic grips.

The transmitter's layout is quite functional: the trims and channel-3 switch are next to the wheel. The two grip switches are easily accessible with your left thumb. Though its case seems a little large, it's well-balanced and weighs a reasonable 21.3 ounces with the batteries installed. The receiver is one of the smallest and lightest in its class—a scant 0.6 ounce with a case size of 1.44x1.02x0.61 inches (36.6x26x15.5mm).

I dedicated a few days to learning the Presto's features; here's what I found most appealing:

- **Anti-lock brake system (ABS).** This helps to prevent the wheels from locking when you drive into a corner and have to really stand on the brakes.
- **Grip dial brake adjustment (GDB).** This allows you to increase or decrease braking with just a touch of your thumb.
- **Four-channel capability.** If you're into scale vehicles, the Presto may be for you. It may be expanded to 4-channel operation with an optional receiver.

FUNCTION MODE

The EX-11's programming system is set up in two easy-to-use menus. The main menu (function mode) is accessed by a single keystroke and has all the basic functions:

- **Model select**—can store settings for up to three models.
- **Steering travel**—sets maximum steering travel with independent left and right endpoint adjustments.
- **Steering response** (exponential)—sets the sensitivity of the steering around neutral.
- **Throttle travel** (forward and backward)—handy for setting up gas-car linkages; allows endpoints to be set independently.
- **Throttle response** (exponential)—adjusts sensitivity around neutral; great for controlling punch off the line.

SYSTEM MODE

The second menu (system mode) is accessed by pushing both the select and FUNC switches. This is where you set up the background functions of the transmitter—stuff that you set once and rarely have to alter.

- **Servo-reversing**—available on all four channels.
- **Auxiliary (channels 3 and 4 setup)**—can be set in positions 1 (1P) to 4 (4P); 1P is equivalent to a push-button switch; 2P is like a toggle, or 2-position switch; 3P and 4P are three- and four-position switches, respectively. Each position can be set anywhere within the limits of servo travel. Channel 3 also includes a linear setting that turns the servo in the direction toward

LIKES

- Easy to program.
- Has 4-channel capability.
- Receiver is small and particularly light.
- ABS.

DISLIKES

- Grip is a little small for larger hands.
- Doesn't include servos.



which you hold the switch (up to a programmed endpoint). After programming the transmitter with channel 3's and channel 4's position, the next menu choice is the switch to do it. There are three assignable switches: two at the left thumb position and one to the right of the steering wheel. These switches can be set to one of four functions: channels 3 or 4, TRAV, or steering dual rates (to set maximum steering travel), or BRAK (to set maximum braking independently of the throttle or throttle trim).

• **ABS cycling speed**—just two settings: SLOW, which is best for gas cars with slower servos, and QUICK, which is for electronic speed controls and gas cars with fast servos. SLOW may also be used with fast servos and ESCs, if track conditions warrant it. Cycling speed refers to the speed of the on/off brake pulses.

• **Model name**—a complete set of upper- and lower-case letters plus special characters, so you can be creative with the names of your cars!

The KO Propo EX-11 Presto is a very capable radio. It's moderately priced, well-balanced and easy to program with terms and functions anyone can understand; and the small receiver is great for cramped installations, but I did find the grips a little small for my large-ish hands, and the case styling is unusual (if you care about that sort of thing).

—Doug Huse

BULLETPROOF!!



A must have for any **RC10GT**

A-arm/Motor Replacement

- > **Flex Problem**
- > **No More Stripped Gears!!**
- > **One Piece Design**
- > **CNC IVCA Grind Aluminum**
- > **Set Screws (no more e-clips!)**

\$59.95 **R&D Racing**



Mrvirw.RnDRacing.com

805.685.4444
800.453.1688

1 Mobile, AL	(334) 633-8446
Gilbert, AZ	(602) 892-0405
Phoenix, AZ	(602) 598-5282
Tucson, AZ	(520) 882-8888
Fayetteville, AR	(501) 571-3730
Fort Smith, AR	(501) 649-9229
Little Rock, AR	(501) 223-5155
Brea, CA	(714) 990-9652
Chico, CA	(530) 899-2977
Fresno, CA	(209) 435-3342
Colorado Springs, CO	(719) 531-0404
Colorado Springs, CO	(719) 637-0404
Fort Collins, CO	(970) 226-3900
Longmont, CO	(303) 774-1557
Westminster, CO	(303) 431-0482
New Milford, CT	(860) 355-3000
Miami, FL	(305) 273-7803
Ormond Beach, FL	(904) 672-5441
Augusta, GA	(706) 855-5003
Columbus, GA	(706) 660-1793
Kennesaw, GA	(770) 426-8800
Macon, GA	(912) 474-0061
Statesboro, GA	(912) 489-8700
Ames, IA	(515) 232-9060
Cedar Rapids, IA	(319) 364-3289
Davenport, IA	(319) 355-2071
Boise, ID	(208) 376-1942
Moscow, ID	(208) 882-9369
Bloomington, IL	(309) 664-4451
Geneva, IL	(630) 208-9062
Machesney Park, IL	(815) 282-0727
Oak Park, IL	(708) 445-8056
Evansville, IN	(812) 477-7200
Indianapolis, IN	(317) 845-4106
Merrillville, IN	(219) 736-0255
Lawrence, KS	(785) 865-0883
Overland Park, KS	(913) 649-7979
Wichita, KS	(316) 683-7222
Alexandria, KY	(606) 635-8223
Lexington, KY	(606) 277-5664
Louisville, KY	(502) 254-5755
Owensboro, KY	(502) 688-9080
Bellingham, MA	(508) 966-3559
Easton, MD	(410) 820-9308
Frederick, MD	(301) 694-7395
Glen Burnie, MD	(410) 590-4950
Ann Arbor, MI	(734) 996-2444
Iron Mountain, MI	(906) 779-0494
Traverse City, MI	(616) 929-5615
Kansas City, MO	(816) 459-9590
Lee's Summit, MO	(816) 525-6885
St. Louis, MO	(314) 394-0177
Jackson, MS	(601) 957-9900
Boone, NC	<i>Coming Soon!</i>
Charlotte, NC	(704) 544-2303
Raleigh, NC	(919) 790-5324
Wilmington, NC	(910) 256-0902
Winston-Salem, NC	(336) 774-2324
Grand Forks, ND	(701) 746-0708
Grand Island, NE	(308) 382-3451
La Vista, NE	(402) 597-1888
Lincoln, NE	(402) 434-5056
Norfolk, NE	(402) 371-2240
Omaha, NE	(402) 498-8888
Farmington, NM	(505) 325-5156
Carson City, NV	(702) 883-5475
Las Vegas, NV	(702) 889-9554
Albany, NY	(518) 435-9961
Amherst, NY	(716) 833-7700
Cincinnati, OH	(513) 697-8224
Columbus, OH	(614) 777-9307
Mentor, OH	(440) 946-5588
Southpoint, OH	(740) 894-6303
Strongsville, OH	(440) 846-1770
Norman, OK	(405) 292-5850
Clackamas, OR	(503) 652-5899
West Chester, PA	(610) 696-9049
Charleston, SC	<i>Coming Soon!</i>
Columbia, SC	(803) 407-2373
Greenville, SC	(864) 627-9633
Sioux Falls, SD	(605) 339-6613
Chattanooga, TN	(423) 877-9885
Franklin, TN	(615) 771-7441
Germantown, TN	(901) 757-8774
Knoxville, TN	(423) 690-6423
Nashville, TN	(615) 851-2400
Arlington, TX	(817) 557-2225
Austin, TX - South	(512) 440-7877
Austin, TX - North	(512) 246-8904
Dallas, TX	(214) 327-2372
Fort Worth, TX	(817) 263-1196
Piano, TX	(972) 758-7875
San Antonio, TX	(210) 829-8697
Salt Lake City, UT	(801) 964-8242
Virginia Beach, VA	(757) 464-4140
Lynnwood, WA	(425) 774-0819
Redmond, WA	(425) 558-0312
Tukwila, WA	(206) 575-0949
Brookfield, WI	(414) 782-4332
Green Bay, WI	(920) 490-9996
Oshkosh, WI	(920) 426-1840
Sheboygan, WI	(920) 452-0801
Cross Lanes, WV	(304) 776-7259

PRODUCT watch

TEAM KYOSHO Carrying Bag King Tote!

Quick; describe the essence of R/C racing. Fun with friends? Competitive spirit? Educational excitement? Yeah, those all sound good, but R/C racing is *really* about lugging stuff around: tires, tools, parts, cars, transmitters, chargers—all the toys you need to get through a Sunday's worth of door-banging action. I usually show up at the track with gear balanced on my arms like those guys who make New York-style wieners—not too efficient.

To make life easier, I've started to use Kyosho's* carrying bag for clunkier items such as my charger, tires, soldering iron, parts boxes and so on. The bag is made of foam-cushioned nylon; a thick cardboard liner gives it shape, and a pair of cardboard drawers are stacked inside. Kyosho doesn't bill the bag as a car carrier, but the drawers are big enough (22x17x10 inches) to comfortably hold an oval or touring car. Off-road vehicles, however, don't fit. Wrap-around handles support the bag well, and the zip-away side panel allows access to the drawers.

The only real problem with the big bag is its correspondingly big price; at a list price of \$71.99, it ain't cheap. Replacement drawers aren't easy on the pocketbook either; try \$30.99 for a pair of what are essentially cardboard boxes (ka-ching!). Needless to say, I'll be reinforcing mine with plenty of packing tape to make 'em last! Despite its steep price, I recommend the Team Kyosho Carrying Bag to all, "everything-but-the-kitchen-sink" racers; if you gotta have it all, this is the way to get it to the track easily

—Peter Vieira

*Addresses are listed alphabetically in the Index of Manufacturers on page 209.



LIKES

- Large capacity.
- Solid construction (but don't sit on it).
- Good-looking "team driver" design.

DISLIKES

- Pricey.
- Drawers aren't large enough to hold off-road cars.

Coming soon!

from the editors of **RADIO CONTROL CAR ACTION**

**RADIO CONTROL 1999
TOURING CARS**

The Source for R/C Model Touring

THE **ULTIMATE**
TOURING CAR GUIDE

OVER **60**

MODELS



Look for it at your local hobby shop and newsstand
On sale NOW

Byron RACE Fuel...

Pay Less and Get...

"Higher R's, Lower Temps, Extended Engine Life!"



Higher prices of competitive fuels won't buy you the higher R's, Lower Temps and Extended Engine Life you get with Byron RACE. Higher prices won't buy you the variety of fuel blends Byron RACE Fuel offers. About the only thing higher fuel prices will do is limit the amount of money you can spend on other aspects of this hobby.

Byron RACE fuel—the most popular car fuel in the world! Available in gallons and 1/2 gallons, in nitro percentages and oil blends for sport drivers and competitors.

SEE Your Nearest Byron Fuel Dealer Today and End those higher prices!



Byron Originals, Inc.,
P.O. Box 279, Ida Grove, IA 51445
Phone: 712.364.3165
Fax 712.364.3901

**MADE
RIGHT
HERE IN
THE
U.S.A.**



HOBBIES R US 1.718.821.1319



HPI	RTR's Viper, Alpha, Nissan, F-150	\$265.00
HPI	Nitro RS4 W/12	\$195.00
HPI	Mercedes Nitro RS4	\$205.00
HPI	Super Nitro RS4 Viper, Alpha, F-150	\$265.00
HPI	Nitro Racer W/O Engine	\$195.00
HPI	Nitro Racer W/OS CVX W/PS	\$299.00
HPI	Nitro Racer W/OS CV	\$279.00
HPI	Nitro Mini Civic	\$195.00
HPI	A-970 Tune Pipe/Header Combo	\$ 65.00
HPI	A-950 Exhaust Header	\$ 22.00
HPI	A-930 Graphite Upper Deck	\$ 16.95
OS	.12CV	\$ 85.00
OS	.12CVX	\$109.00
OS	.15CV	\$109.00

OS	.15CVX	\$139.99
HPI	NovaRossi .12	\$139.99
Serpent	1/10 4WD Sedan W/MTR NEW	\$375.00
Traxxas	Nitro 4-Tec W/Radio RTR	\$299.00
Traxxas	Elec. Rustler RTR W/Radio	\$160.00
OFNA	1/8th Ultra Worlds GT	\$299.00
Hobbico	900 AC/DC Charger	\$ 24.99
Piranha	1500mAh Battery	\$ 14.00
Associated	RC10GT Team W/12CVX W/PS	\$345.00
Associated	RC10GT Sport W/12CVX W/PS	\$259.00
DuraTrax	Maximum ST RTR W/Radio	\$249.00
CVEC	1/10th Pipe Asst. Colors	\$ 54.95
CVEC	1/8th Pipe Asst. Colors	\$ 63.00

Nagengast Hardware & Hobbies 68-02 Fresh Pond Rd. Ridgewood, QUEENS, NY 11385

We accept all major credit cards, checks and money orders. We charge a minimum of \$5.95 for shipping and handling. All prices are subject to change without notice, and we are not responsible for typographical errors. All warranties are handled through the manufacturer. All opened and/or used merchandise can not be returned. THANK YOU!

MILITARY MUSCLE

Painting and detailing tips

Continued from page 108

5. With the color sprayed onto the parts, I placed the turret on the hull and then on a stand so I could paint the camouflage. To paint the camo, I switched tips—from heavy to medium. The medium tip allowed me to spray camo "lines" of varying widths. I randomly picked spots and sprayed squiggly, patchy patterns. I like to hold the airbrush about three to four inches away from the body. Spray a small area, stand back to see how it looks, then line up your next bit of camo. Check the look frequently; you can always go back and add more, but it's hard to cover up a mistake. This process shouldn't take too much time; it only took me half an hour to paint the dark brown camo.

6. With the hull painted, it was time to add the decals. Tamiya supplies water transfer decals. Simply soak the decal in water and place a little water on the area where the decal goes. When it slides around on the paper, take the decal out of the water, still on the paper, and slide it onto the area where you want to apply it. With a soft paper towel, pat the area dry. Be very careful that the decal doesn't move or stick to the towel as you pat it.

7. A flat (not shiny) clear coat is a must if you want to achieve maximum realism because the decals have a very un-military, glossy finish. Coating the completed vehicle with flat clear will give that realistic, matte military look.

8. Painting the tools, cables and track parts is very simple as well. I painted these parts while they were on the plastic trees with gun-metal paint, and clipped them from the tree only after they had dried. With a paintbrush, I patched the unpainted area from which the part was cut. The handles on the tools were also painted with a fine sable brush (available from any hobby or art supply store). When dry, simply glue the parts to the tank in their respective locations.

Between prep work and waiting for the paint to dry, the process described above is rather lengthy. But with a little patience, your efforts will pay off with a fine-quality, detailed model.

XS SPEED

INSANE PERFORMANCE

5237 Highway 126
Blountville, TN 37617

PHONE:

Order - 1-800-550-3682

Infor - 423-323-1513

Fax - 423-323-1595

E-Mail - DRDALE@USIT.NET



MOTORS
EPIC 24deg FIXED AND REBUILDABLE
FROM \$17.50
DYNO TUNED FORM \$ 26.99
CUSTOM WOUND MODS
BRUSHES SPRINGS ARMATURES &
REPLACEMENT PARTS
CALL FOR ALL YOUR MOTOR NEEDS

SANYO 2000's
AS LOW AS
\$27.99
RACER
TEAM
PRO
XS VOLTAGE CELLS
4, 6 AND 7 CELL PACKS AVAILABLE
6 CELL SPORT PACKS
BARS, SHRINK, WIRE

ALSO-----
BODIES - TIRES - BEARINGS
SPEED CONTROLS - RADIOS
ASSOCIATED - BSR - C+M
RACETECH - HPI - TRAXXAS
IRGANG - RIVERGATE - RPM
AND MUCH MUCH MORE
CALL FOR ALL YOUR **GAS &
ELECTRIC** NEEDS

DEALER INQUIRES INVITED
CALL OR WRITE FOR FLYER

JOIN THE WINNING TEAM

DIVISION OF AAA MODEL SUPPLY
HOME OF LOW PRICES AND HONEST VALUE

ADVERTISER INDEX

AAA Hobby Dist., 175
Ace Hardware Hobbies,
172-174
Ace Hobby Dist., 41
Acer Racing, 195
Airtronics, 39
America's Hobby Ctr.,
182-183
Associated Electrics,
30-31, 47, 67, 83, 113,
118
B&T Racing, 207
Boca Bearing Co., 207
Bolink, 158
Bruckner Hobbies, 152-
153
Byron Originals, 206
California R/C Ctr., 146-
149
Cermak Model Supply
Co., 208
Cirrus, 127
Competition Electronics,
89
Cross Co. Ltd., 151
Dalton Raceway, 195
Deans, 115
DuraTrax, 33
ERI Associates, 195
Futaba Corp. of
America, 81
GTP California, 102
General Silicones, 91
Genka Trading Corp.,
54-55
GM Racing USA, 94-95
Hammad Ghuman, 76-
77
Hitec RCD, 27, 73, 159
Hobby Etc., 185
Hobby Products Intl.,
28-29, 84-85
Hobby Shack, 154-157
Hobby Tech, 120
Hobby World, 196
Hobbytown USA, 188
Horizon Hobby Dist., 19
Kawada USA, 111
Keyence Corp., 57
Kondo Kagaku Co. Ltd.,
119
Kyosho, 14-17, 59, 130
LRP Electronics, 118

M.D. Planes, 180-181
MIP., 122
Machi Hobbies, 195
Magma Intl., 145
Model Rectifier Corp., 9
Mugen Seiki Racing
Ltd., 166
Nagengast Hobbies,
206
New Era Models, 195
Novak Electronics, 11
NRCTPA, 100
O.S. Engines, 35
OFNA Racing, 20-21,
42-43, 68-69, 92-93,
141
Omni Models, 192-194
Parma Intl., 65
Peak Performance, 66
Penguin R/C, 207
Precision Model Dist.,
58, 114
Pro-Line, 6-7, C3
Pro-Max, 75
R&D Racing, 186
R/C Car Kings, 167
R/C Touring Cars, 191
Reedy, 83
Robinson Racing, 44-45
RPM, 197
S.E.I. Racing, 189
Savon Hobbies, 168-
171
Schumacher, 131
Serpent USA, 142-143
Sheldon's Hobbies,
198-199
Stormer Hobbies, 200-
203
Tamiya America, C2, 36-
37, 187
Team Corally, 53
Team Losi, 51, 121
Team Orion, 63, 129,
165
Tekin Electronics, 150
Tower Hobbies, 132-137
Traxxas, 101
Trinity, 3, 4-5, 12-13, 22,
24-25, C4
Ultimate Hobbies, 190
XS Speed, 206
Yokomo USA, 48-49

RADIO CONTROL CAR ACTION (ISSN 0886-1609, USPS 001-087, IPM 1534580) is published monthly by Air Age Inc., 100 East Ridge, Ridgefield, CT 06877-4606, USA. Copyright 1998, all rights reserved. The contents of this publication may not be reproduced in whole or part without the consent of the copyright owner. Periodical postage permit paid at Ridgefield, CT, and additional mailing offices.

SUBSCRIPTIONS. U.S. and Canada, call (800) 877-5169; fax (815) 734-1223, or set your Web browser to <http://www.airage.com/> subscribe.html. U.S. \$34.95 (1 year), \$59.95 (2 years); Canada, \$51.30 (1 year), \$91.95 (2 years). Canadian prices include GST, reg. no. 13075 4872 RT. Elsewhere, call (815) 734-1116; fax (815) 734-1223; \$47.95 (1 year), \$85.95 (2 years). All foreign orders must be prepaid in U.S. funds; Visa, MC and AmEx accepted.

EDITORIAL. Send correspondence to Editors, *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. We welcome all editorial submissions, but assume no responsibility for the loss or damage of unsolicited material. To authors, photographers and people featured in this magazine: all materials published in *Radio Control Car Action* become the exclusive property of Air Age Inc., unless prior arrangement is made in writing with the Publisher.

ADVERTISING. Send advertising materials to Advertising Department, *Radio Control Car Action*, Air Age Inc., 100 East Ridge, Ridgefield, CT 06877-4606; phone (203) 431-9000; fax (203) 431-3000.

CHANGE OF ADDRESS. To make sure you don't miss any issues, send your new address to *Radio Control Car Action*, P.O. Box 427, Mount Morris, IL 61054-9853, six weeks before you move. Please include the address label from a recent issue, or print the information exactly as shown on the label. The Post Office will not forward copies unless you provide extra postage.

POSTMASTER. Please send Form 3579 to *Radio Control Car Action*, P.O. Box 427, Mount Morris, IL 61054.

INDEX OF MANUFACTURERS

Acer Racing
P.O. Box 5680,
Santa Monica, CA 90409-
5680; (310) 775-6435;
fax (310) 472-4870; website:
www.acerracing.com.

Airtronics
1185 Stanford Ct, Anaheim,
CA 92805; (714) 978-1895;
fax (714) 978-1895.

Associated Electrics
3585 Cadillac Ave., Costa
Mesa, CA 92626-1403;
(714) 850-9342;
fax (714) 850-1744;
website: www.rcio.com;
www.team-associated.com.

AstroFlight Inc.
13311 Beach Ave.,
Marina del Rey, CA 90292;
(310) 821-6242.

Bich'n Bodies
4903 Cloverfield Rd.,
Pearland, TX 77584;
(281) 485-0375.

Blue Thunder
4105 Fieldstone Rd.,
Champaign, IL 61821;
(217) 355-9511-

BRP Inc.
1575 Lowell St., Elyria, OH
44035; (440) 284-0270;
fax (440) 284-0271.

CEN
distributed by Genka Trading
Corp., 1800 East Miraloma
Ave., Ste. F, Placentia, CA
92870; (714) 792-1923;
fax (714) 792-1968.

Corally
Ploegstraat 49, 3319 LG
Dordrecht, Holland.

Cross Racing
distributed by GTP,
600-A Anton Blvd. (404),
Costa Mesa, CA 92626.

Deans
7628 Jackson St., Paramount,
CA 90723; (562) 634-9401;
fax (562) 634-9403; website:
www.Deansco@earthlink.net.

Dynamite
4105 Fieldstone Rd.,
Champaign, IL 61821;
(217) 355-9511;
fax (217) 352-0355; website:
www.horizonhobby.com.

GM Racing
416 Ohio Ave., McDonald, OH
44437; (330) 530-2330;
fax (330) 530-2333; website:
www.gm-racing.de.

Genka Trading Corp.
1800 E. Miraloma Ave., #F,
Placentia, CA 92870; (714)
792-1923; fax (714) 792-1968;

Hammad Ghuman Inc.
6 Tower Heights, Albany, NY
12211; (518) 782-9255;
fax (518) 782-9256;
website: www.1hg.com.

Hitec RCD Inc.
12115 Paine St., Poway, CA
92064; (858) 748-6948;
fax (858) 748-1767;
website: www.hitecrcd.com.

HPI
15321 Barranca Pky.
Irvine, CA 92618; (949)
753-1099; fax (949) 753-1098;
website: www.hpiracing.com.

KO Propo
4-17-7, Higashi-Nippori,
Arakawa-Ku, Tokyo, 116-0014,
Japan; 81-3-3807-7751;
fax 81-3-3807-8155;

**Kyosho/Great Planes
Model Distributors**
P.O. Box 9021, Champaign, IL
61826-9021; (800) 682-8948.

Loctite Corp.
18731 Cranwood Ct.,
Cleveland, OH 44128;
(216) 475-3600; customer
service (800) 338-9000.

Losi
13848 Magnolia Ave., Chino,
CA 91710; (909) 465-9728;
fax (909) 590-1496;
website: www.teamlosi.com.

LRP
distributed by Associated
Electrics or Wilhelm-
Enssle-Str. 134, 7064
Remshalden, Germany.

MIP
830 W. Golden Grove Way,
Covina, CA 91722;
(626) 339-9008;
fax (626) 966-2901; website:
www.miponline.com.

Model Rectifier Corp. (MRQ)
80 Newfield Ave., Edison, NJ
08818-6312; (732) 225-6360;
fax (732) 225-0091;
website: www.modelrec.com.

OFNA Racing
22692 Granite Way, Ste. B,
Laguna Hills, CA 92653; (949)
586-2910; fax (949) 586-8812.

Orion
distributed by HPI.
(address above)

Pentagon
distributed by Schumacher,
(address below)

Pro-Line/Jaco
P.O. Box 456, Beaumont, CA
92220; (909) 849-9781;
fax (909) 849-2968.

Protoform Inc.
P.O. Box 456, Beaumont, CA
92223; (909) 849-9781;
fax (909) 849-2968.

**Reedy Modifieds/
Team Associated**
3585 Cadillac Ave., Costa
Mesa, CA 92626; (714)
850-9342; fax (714) 850-1744.

Robinson Racing Products
4968 Meadow View Dr.,
Mariposa, CA 95338;
(209) 966-2465;
fax (209) 966-5937-

Schumacher USA
6302 Benjamin Rd., Ste. 404,
Tampa, FL 33634;
(813) 889-9691;
fax (813) 889-9593; website:
www.racing-cars.com.

**Sermos RC Snap
Connectors Inc.**
Cedar Corners Station, Box
16787, Stamford, CT 06905;
(203) 322-6294.

Serpent Inc. USA
West Park Center, 2832 NW
79th Ave., Miami, FL 33122;
(305) 639-9665;
fax (305) 639-9658.

Tamiya America Inc.
2 Orion, Aliso Viejo, CA
92656-4200; (800) TAMIYA-A;
fax (714) 362-2250;
website: www.tamiya.com.

Team Orion Inc.
15311 Barranca Pky., Irvine,
CA 92618; (949) 864-1720;
(949) 864-1722.

Testor Corp.
620 Buckbee St., Rockford, IL
61104; (815) 962-6654;
fax (815) 962-7401.

Tekin Electronics
940 Calle Negocio,
San Clemente, CA 92673;
(949) 498-9518;
fax (949) 498-6339;
website: www.tekin.com.

Traxxas Corp.
12150 Shiloh Rd., #120,
Dallas, TX 75228; (972)
613-3300; fax (972) 613-3599;
website: www.traxxas.com.

Trinity Products Inc.
36 Meridian Rd., Edison, NJ
08820; (732) 635-1600;
fax (732) 635-1640; website:
www.teamtrinity.com.

Yokomo USA
Airport Business Center,
17951 Skypark Cir.,
Ste. K, Irvine, CA 92614;
(714) 252-8663;
fax (714) 252-8657; website:
www.yokomousa.com.

Chris's BACK LOT

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o *R/C Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. My email address is: chrisc@airage.com.

BY CHRIS CHIANELLI

Writers' Wrides

Every once in awhile, we get email asking about the "big" cars we play with. I guess it's only fair; you've gotten to know us behind the keyboard—so here we are behind the wheel. Like it or not, our cars do say something about us.



Chris' Series III Excalibur

I've had people (yuppies, mostly) say, "Chris, isn't that car just a little ridiculous?" A little? Don't you mean full-on preposterous, or maybe high-fantastical? I'd say this car is 100 percent nonsensical, and you know what? That's exactly the way I feel about the world we live in.

Gee, I think I need more junk hanging off the front.

For those of you who have questions about my weird car, here's a close-up of the factory specs placard to clear things up.



Above: ha ha! I have three! Right: Luna's ball is always there waiting for her. Below: a Corvette 454, the height of inefficiency! Eight miles per gallon of "ethyl." (Thaf s old-car talk for high-octane.)



Peter and his Mercury Colony Park

If you're wondering what happened to the Family Truckster after the Griswolds were through with it, now you know. What this car really says about Peter is that he's a true gentleman; he lets his lovely wife drive the new Camry while he amiably endures the horror of Chris's jokes about the suburban-survival vehicle he drives to work.



Left: Y2K Emergency Spam rations. Right: stink-bomb defense nozzle for warding off impatient, tailgating soccer mommies with unresolved entitlement issues.



Below: yes, this car is equipped with fool-injection, I mean fuel-injection. Hard to believe, isn't it? Right: on weekends, Peter and the Colony Park moonlight for Acme Funeral Services.



Greg's Eagle Talon TSi AWD 16V DOHC Turbo

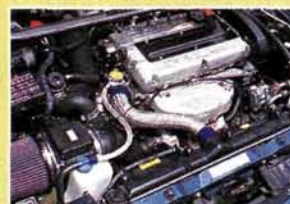
Gee, judging by Greg's wise-guy smirk, I thought he'd at least have been driving the TSi5WD 58V QOHC Super-XXXLimited-Pro-Special Ram-JetMysterion FAFM0 (For a Few Men Only) Turbo version of the Talon; guess not. Every company needs a resident boy-racer complete with alien glasses, annoying driving habits and major 'tude.



One must check for optimal "cool expression" when passing good-looking girls.



This option is standard equipment on the Mysterion version. Ha ha, Greg; you had to pay extra.



240hp and 18 to 20mpg—and thaf s with Greg driving like a complete "richard," if you know what I mean.



Coupe De'Pond

Master Steve is a dependable man of excellence, unswerving in his commitment to improve his self-importance and have the last word.